NEWSLETTER No. 27

REMOTE IMAGING GROUP

DEC 1991

REMOTE IMAGING GROUP.....OFFICERS 1991

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FROM THE EDITOR'S DESK

At the risk of having more than one 'waffle' page. May I nonetheless take the opportunity on behalf of the editorial team of wishing all our members a happy New Year, and make some brief comments regarding our magazine.

With a membership of well in excess of a thousand, we're a substantial group, but I certainly hope we never lose the personal feel for which the group is famous. It's probably inevitable that the 'elder statesmen' of the group are among the most well-known but it's good to see an increasing number of new names and faces getting involved. We want to continue to widen the contribution base but also get to know the RIG family better. So can I encourage more of our correspondents to follow Roger Belcher's lead (see article) and send in a quick C.V. of themselves, your work, your hobbies, even the odd family detail (if you have an odd family!). On the other side of the coin, if you read the article by 'Circuit Breaker' you'll appreciate the effectiveness of occasional tongue-in-cheek anonymity. Our Treasurer is still trying to find out who wrote the 'odè'!

Some of us can well remember the thrill of the first attempts at weather satellite reception. The first ping-ping in the radio loudspeaker, the first dirty smudges on a piece of photographic paper that were definite outlines of clouds. But many of us have progressed a fair bit from those early days, and the frontiers have been pushed back, but just when things have become mundane we're made to realise again what an amazing hobby this really is by someone who has just got the 'bug', and who's jaw has dropped at the pictures in the shack, and wants to know where to begin. Ray Godden has done an excellent introductory pack for the group to meet just this need, and we're delighted to publish the bulk of it in this issue, so that we all know what's on offer to newcomers.

I am reliably informed that a clear symptom of the W-SAT 'disease' is the desire to tinker with your setup to just tune it up that little bit more. I confess to not having screwed the cases on any of my home-made receivers for this very purpose. I am a tweakerholic! You can't help but feel that there is always something you could do to improve things just a bit. Well it's good to have professional help near at hand, and the first of a couple of articles by Roger Belcher should help us to check out our systems against the way professionals tackle the problem of squeezing the last bit of performance out of a receiver. Is your superhet as super as you think? Read on!

One of the larger sub-sets of our group is the educational field, and this issue we've input from one of the more satellite orientated of these establishments. The students at the college in Devon have been keeping a watchful eye on the satellite band, and the fruit of their careful and systematic logging of events is worth noting.

May I close by thanking all our contributors for 1991, the contributions have been of a generally high standard and much appreciated. Your greetings and thanks to the new editorial team have also been noted, and constructive comments have been passed on to the Chairman or committee. But we all need to note that now the backlog has been sorted out, in the future deadlines are going to be strictly adhered to. In the office where I used to earn a crust, it was noticeable that people got severely injured in the struggle to all sign the arrival book in the last minute before we were due to start work. Can I just point out that it is the editor and compositor who can also get severely injured if all the contributions arrive on the last day. Could you make it your New Year resolution that you will get round to writing that article NOW!!?

Cheers, James Brown

FROM THE MAKE-UP EDITOR'S KEYBOARD

Well, we are gradually catching up on the issue dates. The September edition was made up quite early, but held up by the printers who do our centrefold photographs. It seems that we just can't win! We hope to have this edition on your doormat during the first half of January (famous last words!). The new HP Laserjet IIIP has arrived, an has been set up for the artwork for RIG magazine. You may notice an improvement in the print quality, especially with bold typefaces, in this issue. We now have scaleable fonts and italic available.

Deadline for March Issue (RIG28) is 7th February. To all of you out there... Please let us have some more articles. We now have around 1000 members, but get very few articles sent in. Let us know of your experiences in the Weathersat field, or give us a review of your current sofware/hardware packages. Your experiences, however basic, may help others, just beginning, to sort out their problems. We also like to receive member's letters about the Magazine, stating your like and dislikes (not too many dislikes!) with any ideas for improvements.

FROM THE WITTY DITTY WRITER...

It comes around, same time each year,
To some it's JOY, to some it's fear.
Of slowing down, of going bald,
of growing fat, of getting old.
Of loosing teeth, of going grey,
we all must have that special day.
Twenty-one or Half-a-Century,

HAPPY 50th BIRTHDAY HENRY!

STATEMENT between TIMESTEP and AMSAT-UK
Dated 28/10/91

Timestep and AMSAT-UK jointly refer to the article which appeared under the heading "Instantrack Software" in the August 1991 issue of "Oscar News".

As a result of a breakdown in communications, Timestep did not receive written confirmation from Franklin Antonio, the author to sell under Licence, although a licence has now been granted and all Royalties have been paid. (16/10/91)

AMSAT-UK acknowledge that, although acting in good faith from information received, the other allegations concerning David Cawley and TIMESTEP Electronics are incorrect.

In view of this Statement, both parties agree to take no further action.

CHAIRMANS WAFFLE...

It is with a fair amount of regret that I inform you of a change at the top. Dr Des Watson has informed me that he will step down as Membership Secretary. He has an increased work load from the University, the Editorship of an Academic Journal and an expected stay in the USA for several months next year.

All the committee will miss Des very much, especially myself. He has been on the end of the phone many-a-time and delivered the goods reliably and on time. He has handled all our Membership correspondence extremely efficiently. Without Des's help, getting RIG going would have been a very much more daunting task. I can remember giving him a bundle of papers with addresses on them, in variously legible hand writing. Des deciphered about 325 addresses from them and produced the address labels for the original "Invitation" as I call it. Producing that first or pre number 1 Newsletter was kids play compared with Des's job. He has done this very efficiently and I cannot recollect any complaint from "Norton". He has been a cornerstone to build the Remote Imaging Group out from. I am sure that we all wish him well in the future. I hope that he will stay in touch because I know that he has certain skills that we will hear about in the future. His postman will breathe a sigh of relief and no doubt his wife and family will see more of him. I hope its not too long before our paths cross again.

We have been very fortunate in getting Ray Godden to take on the membership secretary's job. All membership renewal forms and enquiries should be directed to Ray. Des is helping to get Ray established so there shouldn't be too many problems, but bear with us if we do have a few hic-cups. This is the last Newsletter (belatedly) of the 1991 Subscription. If you don't renew there will be no more Chairman's Waffles - unless you have paid for more than 1 year. Check the envelope for any code to say if you are in credit! By the end of 1991 the membership had reached 1100 and I think that is the highest ever reached. The group's turnover has increased by a remarkable amount from previous years and makes my farming activities look a bit sick - perhaps I should spend a little more time working there!

I mentioned last time that I was taking the XYL away for a few days. You can imagine that it wasn't far enough from RIG for her liking. The first night (a Sunday) we placed ourselves in a certain congregation just 2 minutes before the service started. A certain amount of surprise was shown but I suspect that a certain Reverend had gotten wind that Henry was about!

That took care of several hours especially when Henry gets talking! We were supposed to be on Holiday I was reminded and we left for the south coast the next day.

My wife should be getting used to my driving by now but it is a little disconcerting to see her foot go by the headlight when I should be braking! We headed for Lyme Regis and arrived in the district about 5pm to look for accommodation. Henry likes to look for the 'off the beaten track' sort of place and we travelled several miles looking for one. Not having found one to the east of Lyme Regis we decided to go to the western side and try our luck there. To get there we had to go through the town itself which is bypassed after a fashion. In the town we saw the Cob and decided to have a quick look because it was so close. On the way down we also came across a lovely thatched cottage advertising B & B. So that fixed us up for that night.

Our host advised us where to go in that ancient part of Britain, all the back streets and footpaths etc. It was a surprise to find so many interesting things to see and of course we had quite a long visit to the Cob itself, mainly in the dark, but the boats are only interested in the state of the tide and not the daylight. We woke the next morning to the sound of seagulls and the view of the Cob. My wife would have liked to stop for another night but we had to travel on.

Next stop was in the middle of Dartmoor, Postbridge to be more precise or more simply Dartcom. It was a miserable day and even the sheep needed maps! Mind you when Henry needs to go somewhere it takes a lot to stop him! I was instructed not to be too long and about 60 minutes later I was back in the car.

Where did we go from there? I hadn't told her that I had already arranged to visit Les and Kay to watch the boats go by in Polruan. We had stayed there a few years before and we found it such a pleasant and charming place. We chin wagged till late and Les even arranged for the Lifeboat to be called out just in case things got boring! Our thanks to Les and Kay for their hospitality. Next morning we had to revisit Dartcom on the way back, but this time you could actually see the charming countryside (its different from my normal abode).

When we approached Dartcom, I was relieved to see that the Mortar was aimed away from the visiting traffic and was not remote controlled to deter unwelcome visitors. I only stayed about 15 minutes this time because we

had to travel a fair distance that day. We needed to get back to Warrick that night so that Joy could go shopping in Coventry the next day. Well that's not her version. It just so happened that it was the last day of the Image Processing Exhibition being held at the NEC and Henry wanted to go! I hadn't been before but I can recommend it to anyone who has the chance to go next year. It was very interesting and I had a good look around.

There were several Remote Sensing type of stands but the thing that took most of my attention were the stands that were demonstrating Hard Copy machines. Samples of their products were eagerly picked up and compared at home with the aid of a magnifying glass. I think that the newer generation of heat sensitive papers are currently giving the best results. There were some dry silver types, giving nearly as good a result, but my expectations still lie with the heat sensitive types.

The drawback to all these machines is the purchase price which was several thousands of pounds too much for Henry's pocket, but you can dream can't you? Running costs seemed to be realistic, in the 10p for an A4 bracket. As I said earlier I didn't stop too long and was back in Coventry by the time shopping was getting tiring. We arrived home in reasonable time to go and get a certain German Shepherd guard dog home just in case he had decided to chewed his way out of his temporary foster home.

094585 666 is the number to watch - well not just yet, but shortly. British Telecom have connected a second line into this establishment for the Electronic Bulletin Board to use when it is ready. David Juett from Cambridge is helping to set it up and it has posed him a few problems. It was not just a case of slinging it together and plugging in as you might have expected. Even the hard disk controller board didn't recognise the 110meg hard disk connected to it as one of its own clan! David has persevered with it and they are now talking to one another, but he is having trouble with the software. I can tell you that it is a fast modem and it will downgrade itself to your standard. It even goes as slow as 300 baud, taking V22bis and V32bis (even 14,400 if yours is the right flavour) in its stride. 8 bits, no parity and one stop bit, I am told is the standard. We shall welcome any comments regarding its contents in due course but lets get it up and running first. Keplers and pictures are taken for granted also progress on the latest Newsletter (that will save a few phone calls). I think that it would be advisable to offer two files of Keplers, one with just the weather satellites in and a second with everything included. That way you can choose what you want. Lets just wait and see how it progresses, but remember 094585 666 is the number to watch! It's new so don't expect miracles.

I normally like to keep a buffer stock of units. Unfortunately I have had rather a lot of orders just recently and the manufacturer has been late delivering the said goods. Hence 3 orders were a lot longer being attended to than I would normally like. Stock levels have been reviewed and I shouldn't have as many problems in the future.

As winter and the shorter days are with us, Henry has actually been watching the polar orbiters! I even tried to let Noaa 9 know that there was life down on the surface! Noaa 9 puts out the visible channel at night and allows me to increase the video gain (contrast) so that even the slightest amount off light shows up.

I studied the predicted path across the sky carefully and memorised the times at certain points. I saw several satellites crossing the sky but all of them going the wrong way! Could I see Noaa 9 ? - not a dicky. I have seen it before but not on this occasion. At the critical time I shone a Quartz Iodine bulb and reflector combination back at it more in hope and desperation than anything else. Back upstairs I go to see the end product, I hoped the signal hadn't dropped out and the scanning receiver scanned round to another channel. Receiver OK but no sign of any response. Perhaps if I put the marker on (in ProSatII) it would indicate where I was? Perhaps at maximum zoom it would show up again not a dicky. Ah well there was a little ground haze and perhaps I need a bigger torch next time!

I have sent out several of the LNA kits but I haven't had any comments on them so far.It would be nice to know if there is any way that we can improve them for new customers. Progress never ceases and the latest devices are now called Pseudomorphic HEMTs. Device noise figures are down to 0.13db, but because of insertion losses, it is not possible to achieve that performance in practice. Their gain is higher and would make extremely good oscillators even if you didn't want them to! I'm beginning to think that you have had one sneeze and have all given up the ghost!

ProSatII has been selling well recently and I have had several favourable comments about it's performance. Because I send out the new purchases, I have records of them all on file. Those of you who have upgraded directly with Timestep I have no record of. I shall not be quite so quick off the mark and you should put me wise when you are speaking to me about it. I've had some adverse comments about the Newsletter becoming a Mail Order catalogue, but you must remember that we can only print material that is sent in to us. It's no good just thinking about doing it - get on with it. Keep in touch with James Brown and put that pen to paper or better still fingers

to keyboard. There is very little that we do not publish so you stand a very good chance of seeing your very own work in print. We only know about the things that we see, perhaps we have missed something and need pointing in another direction. Don't worry about 'not making a very good job of it', we will sort it out, if necessary, and knock it into shape. We need the material - you could possible supply it. So, what are you waiting for? Not the next Newsletter if you haven't filled your forms in, so DO NOT FORGET to renew, those of you that need to.

In the meantime there is the Sandown Rally (our AGM) on Saturday 14th. March 1992. This is much earlier than normal, take note! That about winds it for another Waffle and perhaps I might see some of you at the rallies this year.

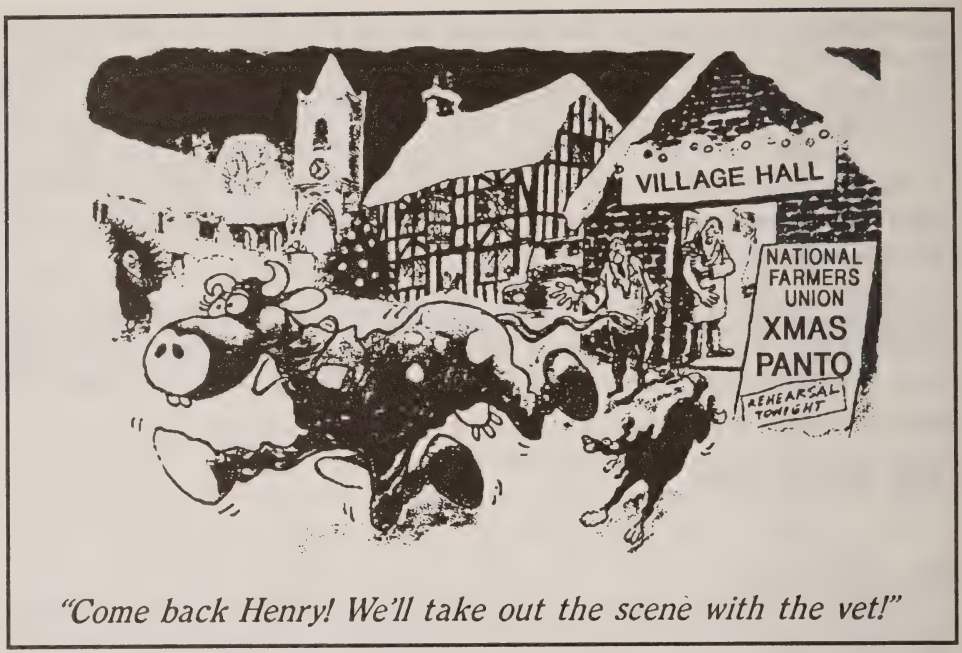
Best Wishes, Henry

PS. BLUE LEDS!
A team from Nagoya University in Japan, a division of the car makers Toyota Gosei, have developed a Blue LED that is 80 times more efficient than those currently available. The old types had an output of around 15 millicandelas and an effiency of only 0.01%. The new ones have an output of 130 millicandelas and an efficiency of 0.8% and run at 12mA at 4-5VDC.

FOR SALE...

Cheetah Telex Machine (ITT 3000) Approximately 7 years old, fully working, with CRT screen, new BT modem, 6 rolls of duplex paper. Reasonable offers please, Will ship at cost, or buyer collects.

Chris Pretty 0420 542752



"Come back Henry! We'll take out the scene with the vet!"

Pinched from Farming News.

To the Witty Ditty Writer

There is a Newsletter Editor from Porthcawl,
who thought his lovely equipment had got it all.
He progressed from Pcsat 3 to Prosat 2
and wondered - was there anything else to left to do?

From high up in the heavens his signals were sent.
To one studious viewer - the messages went.
He turned to the primary on Met-e-o-sat
watching in turn his video screens - there he sat.

One evening, the Atlantic chose to show it's might
and we know there's not-a-lot-to-stop-it in sight.
His high speed data stream started to come and go
but then all-to-gether, completely ceased to flow.

There was a loss-of-signal, the problem he found.
He prodded in here he probed in there, not a sound.
Whose fault was it? The truth was beginning to dawn.
The phone did ring -"'Ere your fishponds on our front lawn!"

"Henry rang" strikes back! -- well, I tried!

FAREWELL TO 1991
Circuit Breaker

It's traditional at the junction of the old and new year to indulge in a little nostalgic reviewing of the year gone by, and to attempt to peer prophetically into the future. In contemplating such themes I was more than struck with the precarious nature of our hobby. Permit me a tongue-in-cheek observation or two...

I mean, if you're a bird-watcher, and the lesser-spotted swivel-beaked reed warbler fails to materialise on your estuary, then there are plenty more places you can go and twitch, and a lot more birds to watch anyway, but when you think about it, as satellite observers we are rather dependent on a handful of national or commercial concerns who actually control the launch and transmissions of satellites.

But who are these potentates, and can they be trusted with our hobby? Is the world of remote sensing safe in their hands and how have they served us this year?

Well, here in Europe, EUMETSAT gets a 'could do better' end of term report. After blowing up Meteosat 3's power amps, and having trouble netting Meteosat 4's 'fishes', we're still waiting to see Meteosat 5 do more than MDD transmissions.

The problems referred to in RIG 25 may be resolved in software patches by Christmas, but what was their cause? A loose screw, a wobbly lens optic, or did they just use the same glue which binds member nations to the Treaty of Rome? Meteosat 3 is now semi-functional in Mid-Atlantic, parked there rather like an old abandoned jalopy as a kind of gesture of good will to Uncle Sam. Like the old car, it goes, but with an output suffering from more dips than a roller coaster it's unlikely to pass the next MOT.

The truth is that APT on Meteosat 3 is rather a joke. Pictures are off more days than on, there's often data corruption, and frequently the gridding has shifted so much that the dreaded earthquake along the San Andreas fault appears to have already happened and California is launched some 500 miles into space. Attempts to locate the drifting giant ice-berg using this bird have so far produced sightings in Buenos Aires and Santiago. It has been suggested, rather unkindly I feel, that the staff at Lannion over-indulge in a cheap local beverage - an impression not diminished by the time when

someone plugged the Meteosat 3 secondary data output into the Meteosat 4 up-link! Not that Darmstat noticed until a certain UK company which seems to keep in step with the time, pointed it out! They were probably too busy working out how to wind back the clock on Meteosat 4 before selling it on to the folk across the pond.

Folk in the USA may well be chuckling to read this, but what about the GOES programme lads? A real shoe-string outfit now I gather with just one properly functioning geostationary satellite to look after, and with the caretaker staff at NOAA holding their breath every day in case an encoder lamp blows, and it becomes a no-goes situation, and they all get their P45's.

A definite gamma minus for the planners as the next launch date slips by months every time you ask, so that 1993 is only just a possibility. It's nice to be wanted, but it comes to something when the USA has to borrow a European satellite, and maybe even ask nicely for two! Mind you, in fairness, NOAA 9 with just over 36000 revs on the clock does deserve something of a medal. The trouble is, it must be about due for a service, and it makes you wonder how they'll do the oil change and fit new spark plugs!

Now the USSR is an interesting scene. In an interview in late November carried by the Daily Telegraph, General Y.V. Trifonov, no less, a spacecraft designer of some repute, revealed that there are now no funds for future weather satellites.

With the political upheavals and economic disarray so great, the weather bureau is apparently under pressure to start selling its data. "It is an insult," he said. "Such information isn't sold anywhere in the world." A crypto-Rigley if ever there was one, and one heartily agrees with his comradely sentiments, but with even the sacred turf of Lord's cricket ground now carrying advertising, how long will it be before we see a character in a shabby macintosh turning up at rallies and trying to sell decoders for encrypted, sync-less, dodgy gain control, non sun-synchronous pictures of Verkhoyansk. Given the reliability of Russian satellites, the chances are that they'll be last year's weather pictures anyway....

It looks as if the Chinese have abandoned APT. Since Tiananman square, it was probably deemed to be too subversive, and likely to corrupt innocent young minds. How many RIG wives have come too late to the same conclusion! Rumour has it that the jettisoning of all the thruster rocket fuel

by a computer malfunction occurred when an operator typed in a wrong code. It should have been a thirty-seven, a fifty-five and a seventy-nine. It was an extra chicken and cashew nuts that emptied the tanks.

Recovery of stabilisation of FENG YUN 1B was thought to have been achieved by altering the position of one of the giant pandas.

This is also the year that the NOAA Bulletin Board became user-unfriendly. Gone is your free access, and instead a nasty $675 dent in your wallet will give you the priceless privilege of knowing that GOES2 is about out of hydrazine.

Given the present crazy trend towards making money out of everything, one is always left wondering if the other end of the wedge is not far off being seen. Somewhere along the line the mutually beneficial nature of the link between amateurs and the commercial and professional world is quietly being forgotten.

I suppose we could always tune in to UOSAT5, the latest bird from the University of Surrey. They get an A + for effort and persistence and I gather that the latest pictures are coming up to pretty high standards these days.

If only we could get past Wally on 2 metres who's forgotten about the satellite band and is bent on being first to break the news to the world that the traffic on the ring-road is a bit heavy, but he's now pulling in to Lavinia Avenue and hopes to meet us again further down his log, and other such rivetting stuff.

Personally I hope his log falls on him, but how about really pushing the prediction boat out, and we go for RAGS1, the first weather satellite to be launched by a joint UK/USA consortium of amateurs? The mind boggles!

We could use some redundant steel piping from a frustrated export order to the Middle East to put it into orbit, and there are several RIG homes which sufficiently resemble Cape Canaveral to control the launch.

It would have to be placed in an eccentric orbit of course, dipping to just a few hundred feet above Sutton St. James to permit remote controlled crop-spraying, and it would always be late... to allow the RIG keplers to catch up, and there could be problems in getting an electrically de-spun loop-yagi but who knows! It could also combine a voice synthesizer for suitable advertising with the usual infra-red detectors and announce that 'At 52

degrees north, 4 degrees west, the temperature is 10 degrees and why don't you eat at Vera's fish bar?'

Apparently the latest RIG LNA kits have finally laid to rest Darwin's theory of evolution. Those attempting to complete the project have had to admit that the chances of the universe being laid out in the way it is by the work of a Creator are infinitely higher than those of getting all the capacitors soldered in the right place. Some theory of infinite improbability is being invoked to account for those that are successful.

Well, as the French say about eggs, an oeuf is an oeuf. So I will conclude with the fond or forlorn hope that such dire warnings as have been issued (let the reader understand) come to nothing, and that 1992 provides another feast of 'out-takes' and the airwaves reverberate to the sound of a 2.4kHz subcarrier or a digital ditty for many a year to come.

But if they don't, remember and be warned, you read it first in RIG!

UPGRADES...

PC-SAT3 Upgrade disk. July 91, as mentioned in RIG24, including MET3-4. £3.00 handling charge, state disk size required.

PROSAT-II Upgrade disk, including F10, F12, increased resolution on Meteor, floppy disk fix. £3.00 handling charge, state size required.

TIMESTEP HRPT DEMO DISK, 1.4MBt. £3.00 handling charge.

All available from the Chairman.

THE GIF PICTURE LIBRARY
By Mike Goodall

The following are available at present:

Disk 1 UK Noaa: in colour (x4)
Disk 2 UK Noaa: most in colour (x5)
Disk 3 Americas: various (x9)
Disk 4 Americas: various (x8)
Disk 5 Americas: various (x7)
Disk 6 Space: Spaceman, Launch, Mars, Venus, Saturn (x5)
Disk 7 Earth: various HRPT (x7)
Disk 8 Russian Meteor: various (x4)
Disk 9 Various (x5)
Disk 99 Shareware versions of viewing and tracking programs (zipped)

All PC GIF format up to 640x480x256cols.

How the system works: All disks will be copied for members free of charge, providing blank formatted discs are sent to me, with return addressed label and return postage.

Best format is 1.4Mb HD 3.5". All other PC formats, 1.2Mb, 720kb and 360kb, can be copied to, but you will not get more than one or two on a 360kb disk!

Maximum of 6 disks at any one time. Please send extra stamps if possible for me to return overseas enquiries post free.

Overseas Members: As above, but return post is free. I would appreciate any polar orbiter GIF files you have for the Library. Many members, including some overseas, have sent for copies; thanks for extra stamps sent. Also thanks to those who have sent in pictures for inclusion in the library.

THE SOVIET AND CHINESE SCENE

Les Currington

The Soviet and Chinese scene and my end of year natter.

When the Editor phoned to ask for my report in !0 days time for the January addition of RIG I thought he was joking:-- Then I realised that gone are the days when I endeavoured to send a report only to find it was published several months late and of little use to anyone. But this does mean we need plenty of input from you the members; If any of you have any interesting observations please do send them in,or better still an article to include in RIG about your receiving station.

I understand we now have 10% of our members outside the UK including the Soviet Union, so what about it chaps. This now brings me to my Satellite report in this issue and the answer is very little has happened since my report on 25/10/91.any status update will be shown below.

This lack of activity came at a good time for myself as the past month I've been able to update the Shack at this end, including familiarising myself in running the new Prosat Program and fitting a new Hard Disk Drive to my PC. But of most interest to members was the construction of the LNA Kit and fitting to a new Horn Aerial complete with rotators. The results so far are well up to expectations and possibly worthy of an article in a later RIG. I would like to thank all those members that phoned or wrote to me during 1991 giving me excellent report of their observations.

Report as at the 9th December 1991

Meteor 2-19 90-57 137.85 Mhz

After a period of silence, transmissions resumed on the 29/11/91 on an ascending early morning orbit and all images appeared to be normal at the time of writing this report.

Meteor 3-4 91-30 137.3 Mhz

Transmissions resumed again on the 25/11/91 during a early afternoon descending orbit; the IR transmissions covering the polar regions are quite outstanding and worth viewing.

Meteor 3-5 91-56 137.3 Mhz
Several reports have been received of synchronising trouble but detailed studies of this Satellite have been interrupted by the Computer being out of commission, and some updating of the aerial system. However now transmissions have ceased until possible solar illumination improves and the Satellite can be fitted into the right slot.

Meteor's 2-20 Meteor 3-3
These Meteors are at present switched off until they drift into an orbit suitable for transmissions to resume.

Okean 3 91-39a 137.4 Mhz
No reports have been received of this bird for several weeks; but this is the time of year when Okean can be of use to shipping so its worth keeping watch on this frequency.

Feng Yun 1B 137.04 Mhz & 137.8 Mhz
Nothing has been seen of Feng Yun on VHF since the report in RIG 26.

FOR SALE...

Best offer over £300 secures.

1. R.I.G. METEOSAT Down Converter, with weatherproof box, UR67 cable.
2. R.I.G. V.H.F. Scanning Receiver with frequency display, fitted psu.
3. R.I.G. 1 Metre dish with Feedhorn, UR67 cable.
4. Frame Store (with mods).
5. Power supply 12.8v regulated.
6. VHF aerial with UR67 cable.
7. 2 Channel recorder with 20 tapes.
8. 180 event per week Timer.
9. 3 monitors (One R.F. with modulator)
10. Double beam oscilloscope.
11. Books drawings, Data,, N connectors.

Unwanted Project, would have cost well over £800. Must be seen working. For sale AFTER 15th. January 1992.

Telephone B.E. Micklewright, Reading 423493

KEPLER ELEMENTS
Provided by Max White - Kettering Group

	NOAA 9	NOAA 10	NOAA 11
	137.62 MHz	137.50 MHz	137.62 MHz
	84-123	86-73	88-89
EPOCH OF DATA	91339.55558581	91339.53760004	91337.81346139
ACCELERATION	0.00000286	0.00000413	0.00000386
REV NO.			
INCLINATION	99.1599	98.5515	99.0543
R. A. NODE	357.1532	359.3191	294.0530
ECCENTRICITY	0.0014178	0.0014009	0.0011281
ARG OF PERIGEE	305.4318	144.8745	215.4513
MEAN ANOMALY	54.5527	215.3361	144.5843
MEAN MOTION	14.13211001	14.24408868	14.12423359

	NOAA 12	MET 2-16	MET 2-17
	137.50 MHz	137.85 MHz	137.30 MHz
	91-32	87-68	88-05
EPOCH OF DATA	91339.52897244	91283.02197901	91326.87789026
ACCELERATION	0.00000587	0.00000127	0.00000201
REV NO.		20934	
INCLINATION	98.7184	82.5544	82.5406
R. A. NODE	6.9606	269.9326	294.0937
ECCENTRICITY	0.0013773	0.0012811	0.0015789
ARG OF PERIGEE	37.4806	354.4558	299.2303
MEAN ANOMALY	322.7343	5.6457	60.7279
MEAN MOTION	14.21731036	13.83839899	13.84560594

	MET 2-18	MET 2-19	MET 2-20
	137.30 MHz	137.85 MHz	137.85 MHz
	89-18	90-57	90-86
EPOCH OF DATA	91326.62421599	91334.76424764	91338.90825392
ACCELERATION	0.00000194	0.00000348	0.00000103
REV NO.			
INCLINATION	82.5224	82.5477	82.5251
R. A. NODE	171.3477	226.6371	162.1060
ECCENTRICITY	0.0014537	0.0014433	0.0013846
ARG OF PERIGEE	342.8179	237.5980	117.1824
MEAN ANOMALY	17.2485	122.3781	243.0749
MEAN MOTION	13.84210234	13.84050731	13.83424106

	OKEAN 2	OKEAN 3	MET 3-2
	137.40 MHz	137.40 MHz	137.30 MHz
	90-18		88-64
EPOCH OF DATA	91289.61720472	91289.07344084	91334.25614593
ACCELERATION	0.00004080	0.00002134	0.00000035
REV NO.	8774	1970	
INCLINATION	82.5235	82.5244	82.5405
R. A. NODE	8.9399	278.3428	261.6779
ECCENTRICITY	0.0020420	0.0023321	0.0018194
ARG OF PERIGEE	130.2755	190.9139	64.9727
MEAN ANOMALY	230.0239	169.1592	295.3280
MEAN MOTION	14.75775906	14.74165292	13.16936117

	MET 3-3	MET 3-4	MET 3-5
	137.85 MHz	137.30 MHz	137.85 MHz
	89-86	91-30	91-56
EPOCH OF DATA	91338.10627072	91332.90560280	91339.59793425
ACCELERATION	0.00000043	0.00000043	0.00000440
REV NO.			
INCLINATION	82.5559	82.5443	82.5588
R. A. NODE	200.6850	108.1729	49.7127
ECCENTRICITY	0.0016869	0.0018309	0.0013651
ARG OF PERIGEE	78.3125	6.8092	353.0733
MEAN ANOMALY	281.9890	353.3275	7.0191
MEAN MOTION	13.15971091	13.16693494	13.16792644

ALL KEPLERS ARE THE LATEST AVAILABLE AT TIME OF GOING TO PRESS

TIMESTEP BULLETIN BOARD

There is now operating, 24 hours a day, a Bulletin Board that you can use to download Keplers and get other information regarding latest developments in the Weather Sat scene. The Keplers are updated regularly and are in the Amsat format.

The number is 0440 820002, and the protocol is the normal standard 8 bit, no parity, 1 stop bit.

SOVIET REFERENCE ORBITS

Simon Goodall

These are the times of north bound equator crossings (in GMT) and longitudes (in degrees west) for four Soviet satellites. They are given at weekly intervals together with the period and the change in longitude per orbit.

MET 2-19

period 104.10 minutes increment 26.15 degrees

04 JAN 05.56 353	11 JAN 06.13 009	18 JAN 04.47 000	25 JAN 03.20 351
01 FEB 03.38 008	08 FEB 02.11 358	15 FEB 02.29 015	22 FEB 01.02 006
29 FEB 23.52 003	07 MAR 22.26 353	14 MAR 22.43 010	21 MAR 21.16 001

MET 3-4

period 109.42 minutes increment 27.48 degrees

04 JAN 21.52 349	01 JAN 21.39 358	18 JAN 21.26 007	25 JAN 21.13 015
01 FEB 19.10 356	08 FEB 18.57 005	15 FEB 18.44 013	22 FEB 16.41 354
29 FEB 16.28 003	07 MAR 16.15 011	14 MAR 14.12 352	21 MAR 13.59 001

MET 3-5

period 109.41 minutes increment 27.48 degrees

04 JAN 18.18 350	11 JAN 18.03 358	18 JAN 17.49 006	25 JAN 17.35 014
01 FEB 15.31 355	08 FEB 15.17 003	15 FEB 15.03 012	22 FEB 12.59 352
29 FEB 12.44 001	07 MAR 12.30 009	14 MAR 10.26 349	21 MAR 10.11 358

OKEAN 3

period 97.72 minutes increment 24.56 degrees

04 JAN 07.05 005	11 JAN 06.50 015	18 JAN 04.58 000	25 JAN 04.43 009
01 FEB 02.50 354	08 FEB 02.34 004	15 FEB 02.19 013	22 FEB 00.25 358
29 FEB 00.09 008	07 MAR 22.41 001	14 MAR 22.25 010	21 MAR 20.31 355

CENTREFOLD PICTURES

We apologise to both readers and contributors for the problems we have had in past issues in correctly captioning the pictures. It has largely been the case of the left hand not knowing what the right hand was doing. I.E. The pictures go to one place to be dealt with, the rest of the magazine to another, so the captions have often fallen between the two. We will do our best to ensure that this will also be corrected for forthcoming issues, but for now you might like to add the following information to your back issues of the 1991 Magazines.

MARCH, RIG24:

The pictures with information included on the page were produced by the team: Guido Emiliani, Claudio Pagnani and Marciano Righini.

The picture featuring Greenland was of a Meteor 3/3 pass, and was produced and supplied by Les Currington.

JUNE, RIG25:

The first two half page picture were taken by Bob Sansoni, who has an HRPT (High resolution Picture Transmission from polar orbiter satellites) and an PDUS (METEOSAT Primary Data User Station) receiving station. The top image is a visual image of the Po valley in Italy, with the Alps to the north. The lower image is of a complete world disk visual image, transmitted twice an hour on Meteosat Primary with the map data sent separately.

The next two half-page pictures were taken off screen by Peter Hayes, and were referred to in the text of his article on HRPT. The pictures are both NOAA HRPT visible channel excerpts.

The third full-page picture was processed by the Italian team: Guido Emiliani, Claudio Pagnani and Marciano Righini, and is a HRPT visible spectrum picture from the Chinese satellite FENG YUN 1B.

The fourth is from the same team, and is an Infra Red HRPT picture of Switzerland and Italy.

The fifth is an attempt at using dithering techniques to reproduce the grey-levels of a SVGA display on a laser-printer.

The sixth is believed to be a NOAA HRPT visible image of pack-ice around Greenland, by Bob Sansoni.

The seventh and last is of a Primary Data METEOSAT4 image of the Red Sea area.

SEPTEMBER, RIG26:

The first image was a NOAA visible mosaic image of Africa, transmitted by GOES5, when it was operational, supplied by James Brown.

The second was an historic image taken of the Gulf area when the Iraqi's had set fire to the oil wells in Kuwait. the accumulation of pollution can be clearly seen streaming north. The picture was taken and supplied by Les Currington.

Once again, apologies to all concerned, and we hope to keep text and photographs nearer together in the future.

RIG27 CENTREFOLD PICTURE INFORMATION

We feature this month two HRPT pictures which are the work of Guido Emiliano, Claudio Pagnani and Marciano Righiano.

They accompany the description given of the image processing facilities which they have. The picture featuring northern Europe is of a NOAA 12 HRPT Channel 2 (visible) transmission, received on 28th. July 1991. NOAA 12 was on a descending pass and UTC was 0752-0806.

The second is again NOAA 12, but this time a channel 4 HRPT picture was printed of the British Isles, in an ascending pass on the 4th August 1991 UTC 1833-1848. The cities and towns clearly show up as dark pixels, over and against the colder land.

REMOTE IMAGING GROUP ????? QUESTIONS & ANSWERS ?????

Ray Godden

What Is "Remote Imaging?"

It is the process which allows the viewing, at a convenient location, of images scanned by a distant sensing system - in this context images of the Earth's surface and weather generated by orbiting satellites.

What is "RIG?"

An association of those interested, usually as a hobby, in receiving and viewing the signals from weather observation satellites. It was formed about six years ago in the UK and now has a membership, including overseas members, of about 1,000. It is run by a committee under the chairmanship of Henry Neale G3REH.

Why are people interested in such a hobby?

For a variety of reasons. In some cases the interest is technical - many members are radio amateurs. Others are attracted because they find the ever-changing weather patterns fascinating, or even beautiful. The technology can have great educational value in schools and colleges. Now the use of computers for image display and manipulation has extended considerably the range of interest.

What does RIG offer?

A newsletter is published four times a year containing, among other things, current inforamation about weather satellites such as radio frequencies and orbital data, reviews of available hardware and software and constructional articles. Also RIG supplies products and kits, often at advantageous prices - see attached information.

How do I join RIG?

Complete the enclosed form and send it, together with your subscription, (currently £8 for the UK) to the membership secretary, whose address is on the form. Subscriptions are renewable each January 1st: you will receive the current year's back issues, if any, whenever you join.

WEATHER SATELLITES

Weather satellites are of two main types described, according to the characteristics of their orbits, as polar or geostationary.

Polar Orbiters

As the name suggests, polar orbiters follow an orbit which passes over the north and south poles. The orbits can be sun-synchronous so that they pass over any point on Earth at approximately the same time each day. The altitude for a sun-synchronous orbit us about 800km (500 miles), low enough to give excellent resolution - on a clear day details such as large towns, rivers and forests can be seen.

The picture is sent down in a format similar to facsimile or amateur radio slow-scan television, with resolution of the same order as that of television or computer displays. This format is called Automatic Picture Transmission (APT). Radio frequencies between 136 and 138Mhz are used and receiver technology is like that of VHF amateur transceivers or broadcast FM receivers. Reception is possible as the satellite passes from horizon-to-horizon, taking about 13 minutes and covering North Africa to Iceland. The aerial can be quite simple and compact.

In most cases two pictures are transmitted side-by-side, one from a visible light sensor and the other an infra-red image showing land, sea and air temperatures. The two main types of polar orbiter are the American National Oceanic and Aeronautical Administration (NOAA) series and the Russian Meteor series. Currently we have NOAAs 10 and 11 passing overhead and also several Russian and Chinese satellites - there are plenty to receive pictures from! RIG newsletter will keep you up-to-date on what can be seen.

Geostationary Orbiters

A geostationary orbit is in the plane of the equator with a period of 24 hours; thus viewed from anywhere on Earth the satellite appears stationary. The resulting altitude is about 36,000km (23,000 miles). There are several satellites spaced around the equator the one covering Europe is Meteosat IV (not to be confused with the Russian Meteors). Transmission is on a frequency at the low-frequency end of the microwave spectrum. The receiver can either one dedicated to Meteosat, or can be a converter feeding a 136-138MHz unit. Usually a parabolic dish antenna is used, although it is possible to use a high-gain Yagi array.

Meteor sends square images in a format similar to the continuous strip format of the polar orbiters. It is called WEFAX (short for WEather FAX). The satellite scans the whole Earth at high resolution, sends the data to a ground station at Darmstadt near Frankfurt where the images are processed, cut up, country outlines and titles, added and then returned to Meteosat for re-transmission to end users.

For most images the hemisphere is divided into nine squares like naughts-and-crosses grid. The UK and most of continental Europe is in the top middle square. An infra-red image is transmitted every half-hour, so that the view is always topical.

There are many other images taken at different optical wavelengths, such as water vapour as well as visible light, as well as weather charts etc. They are sent to a schedule which is regularly printed in the RIG newsletter.

Receiving Polar Orbiters:-

The international radio frequency for this type of satellite is 136-138 MHz. The carrier is frequency modulated by an audio frequency sub-carrier which is in turn amplitude modulated by the image information. Deviation is +/- 17 kHz; in order to accommodate the modulation sidebands and doppler effects due to satellite motion a bandwidth of 50 kHz is needed. Sub-carrier frequency is 2.4 - 2.5 kHz, which makes images easy to store using an audio cassette recorder. By using an appropriate aerial it is not necessary to track the satellite.

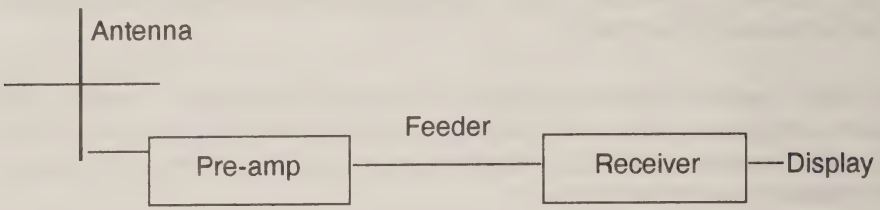
Receiving Geostationary Orbiters:-

Transmission is on a frequency of 1.7 GHz with modulation characteristics like that of the polar orbiters except that deviation in this case is +/- 9 kHz. It is feasible to have a converter feeding a 136-138 MHz receiver, which is what is often done - of course a dedicated 1.7 GHz receiver can be used.

The antenna is usually a dish of about 1M diameter with either the converter itself or a pre-amplifier mounted on or adjacent to it. The losses in even quite short cable runs cause significant performance degradation at this frequency. Modern semiconductor devices such as GaAs FETs, used with care, can make low-noise reception relatively easy to achieve.

WEATHER SATELLITE RECEIVING STATIONS

Polar-orbiting satellites:-



Aerial:-

Crossed dipoles with reflector, phased for right-hand circular polarisation. No tracking required.

Cost - £35 approx. Supplier - J Beam. Or D.I.Y. (not difficult).

Mast head pre-amplifier:-

Optional, to make up the loss in a long feeder run. Powered from the receiver via the feeder.
Cost £16 approx fully aligned and tested. Supplier - RIG.

Feeder:-

Impedance 50 ohms. Use pre-amp if length is more than 20M (UR67) or 10M (thinner coax).

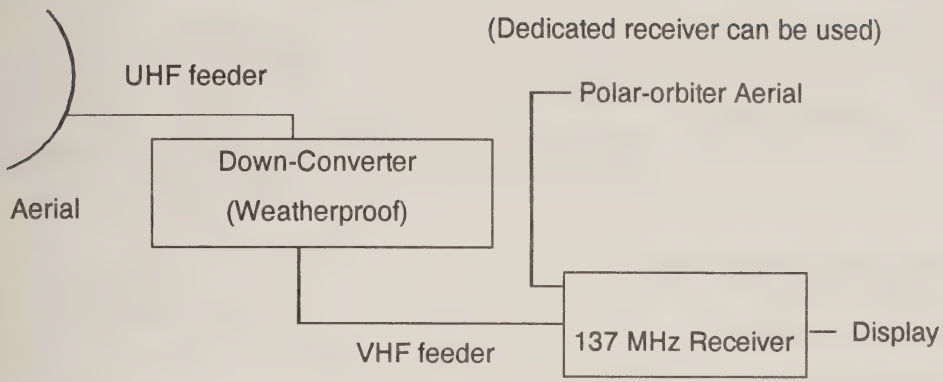
Cost - 70p/metre approx (UR67).

Receiver:-

To cover 136 - 138 MHz and decode FM signal to provide audio output.

Cost £130 approx (LED display), £170 approx (full LCD display). Fully synthesised tuning with auto-scan and programmed for specific satellites. Supplied by RIG as assembled and tested boards.

Geostationary satellites:-



Aerial:-

Parabolic dish, 1 meter diameter, with horizontally polarised feed. Gain 22 dBi. Dish, feed and tripod mount available from RIG.

UHF feeder:-

H100 or UR67 coaxial cable, max length 1.5 M. Cost 70p/meter (UR67).

Down-converter:-

Converts 1.7 GHz signal to 137 MHz.
Supplier - RIG/Dartcom.

VHF feeder:-

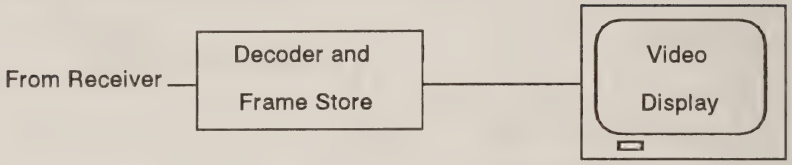
UR67 coaxial cable. Cost - 70p/metre.

Receiver:-

As for polar-orbiters.

DISPLAYING THE IMAGES

Using a frame store -



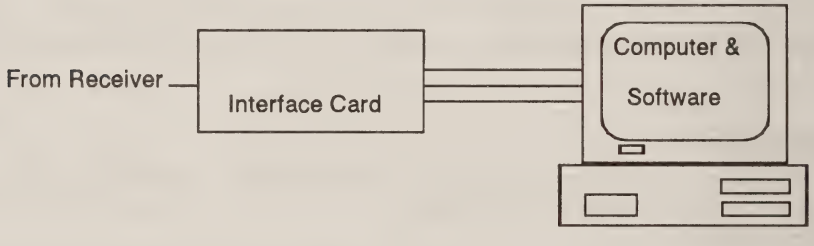
Decoder and frame store:-

Various suppliers.

Video display:-

Monochrome 625 line video monitor. Cost £30 - £60 (surplus market). Or use TV receiver with RF modulator or direct into video input (SCART).

Using a computer -



Interface card and software:-

PC SAT III interface. £140 approx. Supplier RIG.

Other packages available for other computers (Amiga etc.).

The full revised RIG SHOP WINDOW details will be sent with the pack, but here's a reminder of the publications side.

Booklet "Weather Satellites and Their Reception" by Mike Mansfield. VG value at £2.50

Back issues of RIG including UK postage.
1-7 No longer available.
8-19 Full year (or £1 each) £4
20-23 Full year (1990) £5

ORDERS TO:- Henry Neale, RIG Chairman
Thornlea
Fishersgate
Sutton St James
Spalding
LINCS PE12 0EZ
Tel: 0945 85353

Cheques payable to:- "Remote Imaging Group" please

FOR SALE...

ATARI 520 STFM, 1MEG RAM, PLUS PRINTER and COLOUR MONITOR £280.00

ADVANCE SIG GEN 10MHz-300MHz £10.00

AUDIO OSCILLATOR PLUS TRACKING MEASURING SET 10Hz-100KHz OFFERS

MICROVITEC 14" HI RES COLOUR MONITOR, MODEL 1441, RGB I/P £70.00

CLIFF SCRACE, St.Julitta, Gables Rd, Willand, Cullompton, Devon
TEL: 0884 32388

A BRIGHT NEW tySTAR IS BORN

Dave Cawley

The Tystar colour monitor has sold very well to RIG members using the PC solution to capture and manipulate weather satellite images.

These ex-dem or coded units and even some supplied at full price can often benefit from accurate alignment. The ex-dem ones in particular, can suffer from lack of brightness and colour fidelity. Once set up properly they often outperform monitors costing twice the price.

WARNING ! Do not carry out any adjustment unless you are qualified and competent to do so.

If you are unsure do not attempt any adjustments !

Have the computer and monitor in a safe place with plenty of room. Disconnect the mains supply to both units and remove the monitor case by the 4 screws. Reconnect everything and check for proper operation. Do not touch any components in the monitor.

Brightness

Looking at the back of the monitor you will see at the bottom right hand corner a black plastic lump. There are two adjustments. Load a Meteosat test card, turn the brightness and contrast up to maximum. Adjust the bottom black control so that the bottom greyscale is visible and the area around the image is JUST brighter than the dead black.

Colour purity

Still looking at the back of the monitor, you will see a board attached to the neck of the CRT. There are six pots on the top edge. Looking from the BACK of the monitor they are, Red Gain, Green Gain, Blue Gain, then a big gap and then, Green Offset, Red Offset, Blue offset.

With the test card on screen and contrast and brightness up full, carefully adjust the gain controls to get a pure greyscale image with no red, blue or green cast. Turn the brightness down to a dim but visible image, load the

Timestep C03 image and it's colour palette, adjust the offset controls to give a good colour rendering. Repeat both sets of adjustments until you get a good greyscale (no colours) and good colours at all positions of the brightness control.

To finish you could carefully adjust the focus which is the black control above the brightness control at the bottom right had corner.

You should now have a monitor that performs better than nearly all other 14" models, regardless of cost !

STOP PRESS...

VAT REGISTRATION

The Remote Imaging Group, as from 1st January 1992, has had to become VAT registered. The implications of this have not been fully determined at present. More information to follow in the next newsletter.

Those of you who require VAT invoices from 1st January, please contact the Treasurer or Chairman.

WANTED...

A PC computer program to convert NASA 2-line Kepler Element sets to AMSAT format and vice versa.

Also, any good PC palette colouring/viewing programs for GIF and SCF format, similar to PCSAT3/PROSAT2 palette system.

MIKE GOODALL, Make-up Editor.

REPORTS FROM THE PERRY DATA CENTRE, SOUTH DEVON COLLEGE

Marc Blewitt, Duncan Wall & David Salisbury

MET 3/4 & MET 3/5

Acting on the information received from Len Maxim via the Kettering group, that MET 3/4 had been switched off and MET 3/5 had been activated in its place, and was due to pass over us at approximately at 08:45 GMT, we began monitoring for MET 3/5's pass, on all known frequencies between 137 - 138 MHZ.

The pass was as follows:-

SAT A

A.O.S. 08:46 GMT, Frequency 137.30 MHZ.
The satellite was transmitting a visual picture and was North bound from North Africa to North Cape. (Norway)
The satellite was of the MET 3 series and had 240 lines/minute with 12 sync lines. L.O.S. occurred at 09:04 GMT. Duration of 18 minutes. This pass did not coincide with our computer prediction programmes.

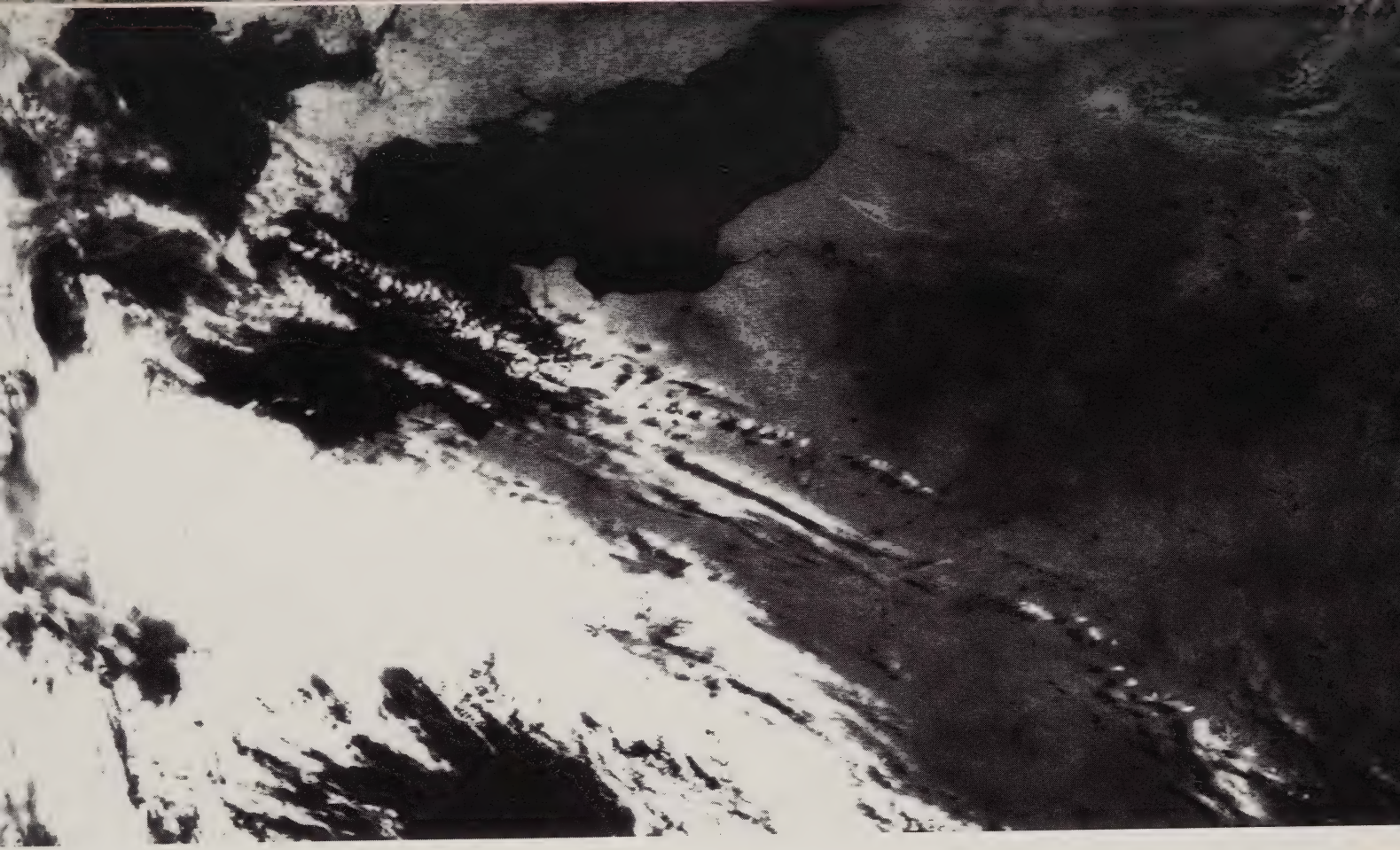
SAT B

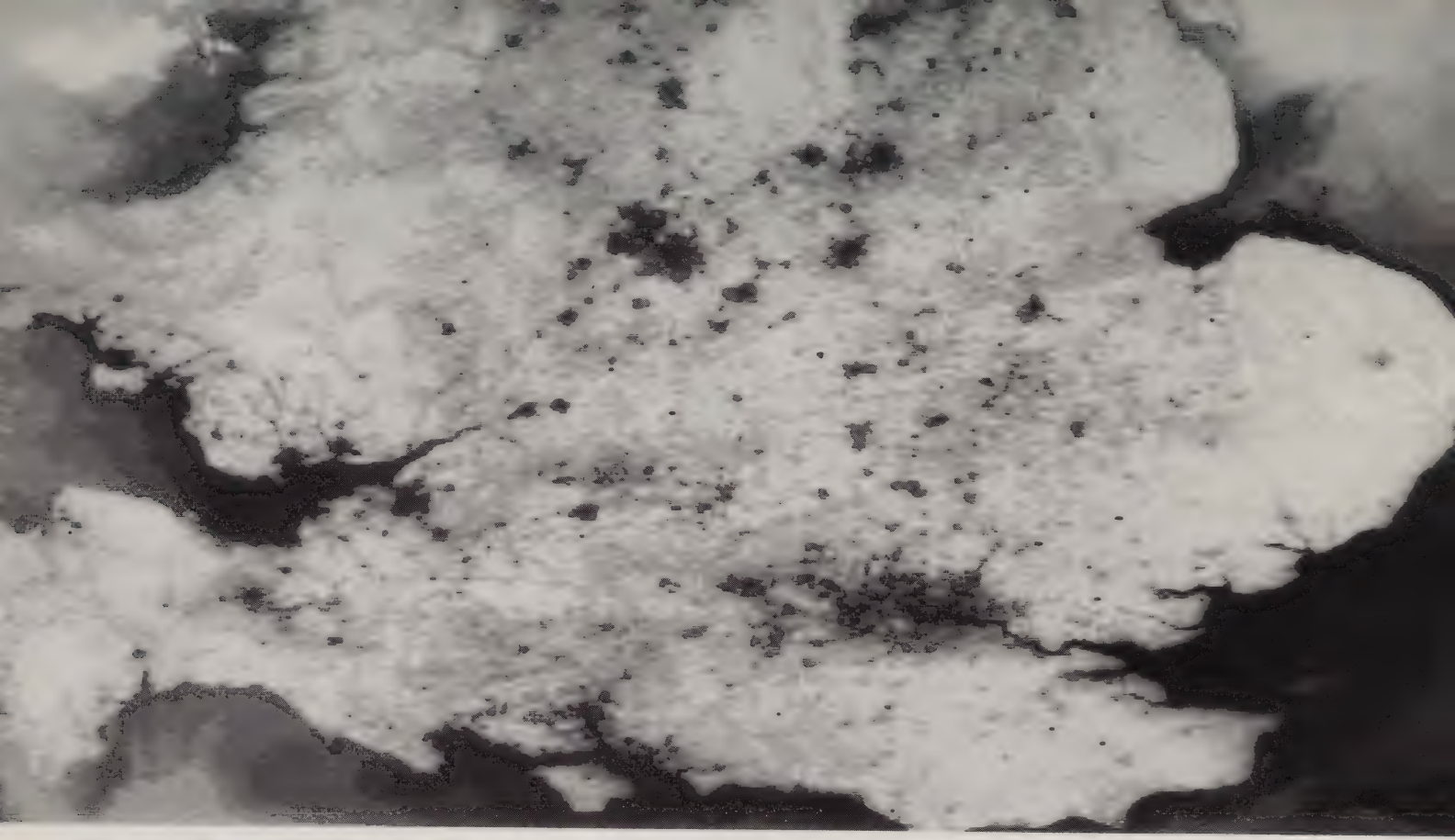
Seven minutes later at 09:11 GMT another satellite on the same frequency passed within range. This pass was as follows:-

A.O.S. 09:11 GMT, Frequency 137.30 MHZ
The satellite was transmitting a visual picture and was Northbound across the Atlantic ocean. The satellite was transmitting 240 lines/minute and had 9 sync lines.

L.O.S. occurred at 09:21 GMT. Duration of 10 minutes. The cross checking of this information with the computer prediction files suggested this was MET 3/5. This information was relayed by telephone to Geoff Perry of the Kettering group, he did not agree with our findings, he also did not hear the second satellite. (SAT B)

As we did not agree, we had to check our results, so we obtained a new element prediction set. It was observed that the MET 3/4 data was pre - 25/9/91 as on that day a manoeuvre took place between 12:00 and 14:00,





NOAA-12, HRPT, Ch. 4, 29 August 1991, 1833-1848 UTC, ascending.
An IR image of Great Britain. The cities and towns are dark (warm) spots.
Printing format: all the lines are printed twice; 600 pixels per line.
By: G. Emiliani, G. Pagnani, M. Righini.

Late News

We are now registered for VAT. This means that the 1992 Subscriptions will be £9-00 VAT inclusive. Please note that this applies to the United Kingdom members only. VAT receipts are available, if required, from the Membership Secretary if a SAE is included.

NOAA 10 Problems

There has been interference on one of the IR channels during the Christmas period. I have also seen problems on other satellites during the same period. Reports of this will follow in the next Newsletter. Henry.

Our man in Moscow.

Alex Zaitzev from Moscow will be visiting the United Kingdom for a few days in April. He is seeking hospitality in the London area and would like to stay with someone with similar interests and would offer reciprocity. He speaks fluent English. Offers to Des Watson 0273813103, who contacts him frequently via Email.

RIG SUBSCRIPTION 1992 - RENEWAL

If you would like to renew your membership of the group and continue to receive the newsletter then please complete the form below not forgetting to complete the survey and send it to **Ray Godden** our membership secretary at the address is below.

Recent joiners are reminded that the subs run from January to December and unless you specifically paid in advance for 1991 then your subs are due now. If our records show that you have already paid for 1992 then the label on the envelope containing this newsletter will say "PAID 92".

The fees for 1992 are as follows:

UK membership	(see Late News)	£9.00
European membership	(£8.00 + £2.00 post)	£10.00
Outside Europe	(£8.00 + £4.00 post)	£12.00

(All non UK post will be sent by air mail as 'PRINTED PAPERS')

Cheques must be made payable to "REMOTE IMAGING GROUP".
Send your completed form (including the completed survey) to:

RIG-SUB
P.O.BOX 142
RICKMANSWORTH
HERTS.
WD3 4RQ
ENGLAND

NAME: _____ CALL SIGN _____

ADDRESS: _____

_____

_____ POST CODE _____

COUNTRY _____

TELEPHONE NUMBER: _____

When writing in to the group please use your callsign if you have one.

(Doc ref RG-SUB92 17 12 91)

NOAA 9 PERIOD 101.95 MINS FREQUENCY 137.62MHz

TIME OF ACQUISITION OF SIGNAL - 52.5 DEG NORTH 0 DEG EAST

1992			1992			1992		
01/01	08.06	17.57	01/02	08.20	18.11	01/03	07.17	18.50
02/01	07.53	17.44	02/02	08.07	17.58	02/03	07.04	18.37
03/01	07.41	17.32	03/02	07.55	17.46	03/03	06.52	18.25
04/01	07.28	17.19	04/02	07.42	17.33	04/03	08.21	18.12
05/01	07.15	17.06	05/02	07.29	17.20	05/03	08.08	17.59
06/01	07.03	18.35	06/02	07.17	17.07	06/03	07.56	17.46
07/01	06.50	18.23	07/02	07.04	18.37	07/03	07.43	17.34
08/01	06.37	18.10	08/02	06.51	18.24	08/03	07.30	17.21
09/01	08.06	17.57	09/02	08.20	18.11	09/03	07.17	18.50
10/01	07.54	17.45	10/02	08.08	17.59	10/03	07.05	18.37
11/01	07.41	17.32	11/02	07.55	17.46	11/03	06.52	18.25
12/01	07.28	17.19	12/02	07.42	17.33	12/03	08.21	18.12
13/01	07.16	17.07	13/02	07.30	17.20	13/03	08.08	17.59
14/01	07.03	18.36	14/02	07.17	17.08	14/03	07.56	17.47
15/01	06.50	18.23	15/02	07.04	18.37	15/03	07.43	17.34
16/01	06.38	18.10	16/02	06.51	18.24	16/03	07.30	17.21
17/01	08.07	17.58	17/02	08.21	18.12	17/03	07.17	18.50
18/01	07.54	17.45	18/02	08.08	17.59	18/03	07.05	18.38
19/01	07.41	17.32	19/02	07.55	17.46	19/03	06.52	18.25
20/01	07.29	17.20	20/02	07.42	17.33	20/03	08.21	18.12
21/01	07.16	17.07	21/02	07.30	17.21	21/03	08.08	17.59
22/01	07.03	18.36	22/02	07.17	18.50	22/03	07.56	17.47
23/01	06.51	18.23	23/02	07.04	18.37	23/03	07.43	17.34
24/01	08.20	18.11	24/02	06.52	18.24	24/03	07.30	17.21
25/01	08.07	17.58	25/02	08.21	18.12	25/03	07.17	18.50
26/01	07.54	17.45	26/02	08.08	17.59	26/03	07.05	18.23
27/01	07.42	17.33	27/02	07.55	17.46	27/03	06.52	18.25
28/01	07.29	17.20	28/02	07.43	17.34	28/03	08.21	18.12
29/01	07.16	17.07	29/02	07.30	17.21	29/03	08.08	17.59
30/01	07.04	18.36	----------			30/03	07.56	17.47
31/01	06.51	18.24	----------			31/03	07.43	17.34

MORNING PASSES ARE SOUTHBOUND EVENING PASSES ARE NORTHBOUND

NOAA 10 PERIOD 101.15 MINS FREQUENCY 137.50MHz

TIME OF ACQUISITION OF SIGNAL - 52.5 DEG NORTH 0 DEG EAST

1992			1992			1992		
01/01	07.41	17.27	01/02	07.08	18.35	01/03	07.22	17.08
02/01	07.17	18.44	02/02	06.44	18.11	02/03	06.58	18.25
03/01	06.53	18.20	03/02	08.01	17.47	03/03	06.34	18.01
04/01	08.10	17.57	04/02	07.37	17.23	04/03	07.51	17.37
05/01	07.46	17.33	05/02	07.13	18.41	05/03	07.27	17.13
06/01	07.23	17.09	06/02	06.49	18.17	06/03	07.03	18.31
07/01	06.59	18.26	07/02	08.07	17.53	07/03	06.39	18.07
08/01	06.35	18.02	08/02	07.43	17.29	08/03	07.56	17.43
09/01	07.52	17.38	09/02	07.19	18.46	09/03	07.32	17.19
10/01	07.28	17.14	10/02	06.55	18.22	10/03	07.09	18.36
11/01	07.04	18.32	11/02	08.12	17.58	11/03	06.45	18.12
12/01	06.40	18.08	12/02	07.48	17.34	12/03	08.02	17.48
13/01	07.58	17.44	13/02	07.24	17.10	13/03	07.38	17.24
14/01	07.34	17.20	14/02	07.00	18.28	14/03	07.14	18.41
15/01	07.10	18.37	15/02	06.36	18.04	15/03	06.50	18.17
16/01	06.46	18.13	16/02	07.53	17.40	16/03	08.07	17.53
17/01	08.03	17.49	17/02	07.30	17.16	17/03	07.43	17.29
18/01	07.39	17.25	18/02	07.06	18.33	18/03	07.19	17.05
19/01	07.15	18.43	19/02	06.42	18.09	19/03	06.55	18.23
20/01	06.51	18.19	20/02	07.59	17.45	20/03	06.31	17.59
21/01	08.09	17.55	21/02	07.35	17.21	21/03	07.48	17.35
22/01	07.45	17.31	22/02	07.11	18.38	22/03	07.25	17.11
23/01	07.21	17.07	23/02	06.47	18.14	23/03	07.01	18.28
24/01	06.57	18.24	24/02	08.04	17.51	24/03	06.37	18.04
25/01	08.14	18.00	25/02	07.40	17.27	25/03	07.54	17.40
26/01	07.50	17.36	26/02	07.16	18.44	26/03	07.30	17.16
27/01	07.26	17.12	27/02	06.52	18.20	27/03	07.06	18.33
28/01	07.02	18.30	28/02	08.10	17.56	28/03	06.42	18.09
29/01	06.38	18.06	29/02	07.46	17.32	29/03	07.59	17.45
30/01	07.56	17.42	----------			30/03	07.35	17.21
31/01	07.32	17.18	----------			31/03	07.11	18.39

MORNING PASSES ARE SOUTHBOUND EVENING PASSES ARE NORTHBOUND

NOAA 11 PERIOD 102.01 MINS FREQUENCY 137.62MHz

TIME OF ACQUISITION OF SIGNAL - 52.5 DEG NORTH 0 DEG EAST

1992			1992			1992		
01/01	04.03	13.54	01/02	03.00	14.33	01/03	04.02	13.53
02/01	03.51	13.42	02/02	02.48	14.21	02/03	03.50	13.41
03/01	03.39	13.30	03/02	02.36	14.09	03/03	03.38	13.29
04/01	03.27	13.19	04/02	04.06	13.57	04/03	03.26	13.17
05/01	03.15	13.07	05/02	03.54	13.45	05/03	03.14	13.05
06/01	03.03	14.37	06/02	03.42	13.33	06/03	03.02	14.35
07/01	02.52	14.25	07/02	03.30	13.21	07/03	02.50	14.23
08/01	02.40	14.13	08/02	03.18	13.10	08/03	02.38	14.11
09/01	04.10	14.01	09/02	03.06	14.40	09/03	04.08	13.59
10/01	03.58	13.49	10/02	02.54	14.28	10/03	03.56	13.47
11/01	03.46	13.37	11/02	02.43	14.16	11/03	03.44	13.35
12/01	03.34	13.25	12/02	04.13	14.04	12/03	03.32	13.23
13/01	03.22	13.13	13/02	04.01	13.52	13/03	03.20	13.12
14/01	03.10	13.01	14/02	03.49	13.40	14/03	03.08	14.42
15/01	02.58	14.32	15/02	03.37	13.28	15/03	02.56	14.30
16/01	02.46	14.20	16/02	03.25	13.16	16/03	02.44	14.18
17/01	02.35	14.08	17/02	03.13	13.04	17/03	04.14	14.06
18/01	04.05	13.56	18/02	03.01	14.34	18/03	04.03	13.54
19/01	03.53	13.44	19/02	02.49	14.22	19/03	03.51	13.42
20/01	03.41	13.32	20/02	02.37	14.10	20/03	03.39	13.30
21/01	03.29	13.20	21/02	04.07	13.58	21/03	03.27	13.18
22/01	03.17	13.08	22/02	03.55	13.46	22/03	03.15	13.06
23/01	03.05	14.38	23/02	03.43	13.35	23/03	03.03	14.36
24/01	02.53	14.26	24/02	03.31	13.23	24/03	02.51	14.24
25/01	02.41	14.14	25/02	03.19	13.11	25/03	02.39	14.12
26/01	04.11	14.03	26/02	03.07	14.41	26/03	04.09	14.00
27/01	03.59	13.51	27/02	02.56	14.29	27/03	03.57	13.48
28/01	03.47	13.39	28/02	02.44	14.17	28/03	03.45	13.36
29/01	03.36	13.27	29/02	04.14	14.05	29/03	03.33	13.24
30/01	03.24	13.15	----------			30/03	03.21	13.12
31/01	03.12	13.03	----------			31/03	03.09	14.42

MORNING PASSES ARE SOUTHBOUND EVENING PASSES ARE NORTHBOUND

NOAA 12 PERIOD 101.34 MINS FREQUENCY 137.50MHz

TIME OF ACQUISITION OF SIGNAL - 52.5 DEG NORTH 0 DEG EAST

1992			1992			1992		
01/01	08.41	18.28	01/02	07.50	19.18	01/03	07.40	19.09
02/01	08.20	18.07	02/02	07.28	18.57	02/03	07.19	18.48
03/01	07.58	17.46	03/02	08.49	18.36	03/03	08.39	18.26
04/01	07.37	19.06	04/02	08.27	18.15	04/03	08.18	18.05
05/01	07.16	18.45	05/02	08.06	17.53	05/03	07.56	17.44
06/01	08.36	18.23	06/02	07.45	19.13	06/03	07.35	19.04
07/01	08.15	18.02	07/02	07.23	18.52	07/03	07.14	18.42
08/01	07.53	17.41	08/02	08.43	18.31	08/03	08.34	18.21
09/01	07.32	19.01	09/02	08.22	18.10	09/03	08.12	18.00
10/01	07.11	18.40	10/02	08.01	17.48	10/03	07.51	19.20
11/01	08.31	18.18	11/02	07.40	19.08	11/03	07.30	18.58
12/01	08.10	17.57	12/02	07.18	18.47	12/03	08.50	18.37
13/01	07.48	19.17	13/02	08.38	18.26	13/03	08.28	18.16
14/01	07.27	18.56	14/02	08.17	18.04	14/03	08.07	17.54
15/01	08.47	18.35	15/02	07.56	17.43	15/03	07.46	19.14
16/01	08.26	18.13	16/02	07.34	19.03	16/03	07.24	18.53
17/01	08.05	17.52	17/02	07.13	18.42	17/03	08.44	18.32
18/01	07.44	19.12	18/02	08.33	18.21	18/03	08.23	18.10
19/01	07.22	18.51	19/02	08.12	17.59	19/03	08.02	17.49
20/01	08.42	18.30	20/02	07.51	19.19	20/03	07.40	19.09
21/01	08.21	18.08	21/02	07.29	18.58	21/03	07.19	18.48
22/01	08.00	17.47	22/02	08.49	18.37	22/03	08.39	18.26
23/01	07.39	19.07	23/02	08.28	18.15	23/03	08.18	18.05
24/01	07.17	18.46	24/02	08.07	17.54	24/03	07.56	17.44
25/01	08.37	18.25	25/02	07.54	19.14	25/03	07.35	19.04
26/01	08.16	18.03	26/02	07.24	18.53	26/03	07.14	18.42
27/01	07.55	17.42	27/02	08.44	18.31	27/03	08.34	18.21
28/01	07.34	19.02	28/02	08.23	18.10	28/03	08.12	18.00
29/01	07.12	18.41	29/02	08.01	17.49	29/03	07.51	19.20
30/01	08.32	18.20	----------			30/03	07.30	18.58
31/01	08.11	17.58	----------			31/03	08.50	18.37

MORNING PASSES ARE SOUTHBOUND EVENING PASSES ARE NORTHBOUND

MEMBERSHIP SURVEY - 1992

In order to understand what current/new members of the RIG are currently interested in we have compiled the questions below which we hope all members will complete.

This survey is conducted every year and the results published in the newsletter.

Please feel free to add any further comments or suggestions on the reverse side of the survey form:

Please tick as appropriate...

1 Are you currently receiving weather satellites on VHF?___

2a Are you receiving Meteosat/GOES/GMS ?___

2b If yes, what kind of aerial: Dish?___ Yagi?___

2c Which make of downconverter?: Dartcom___ Microwave Modules___ Timestep___ Homebrew___ LMW___ Martelec___ Maplin___ Other (name)_____

3 Are you receiving HRPT from NOAA?___ Are you a PDUS for Meteosat?___

4a What equipment do you use for Weather satellite rx and display:
Photographic Fax___ Normal Fax___ Yu3 Framestore___
Personal computer___ Other (name)_____

4b Which Computer do you use for Remote Imaging Reception/Display:
IBM PC/XT/AT (or compatible)___ Amiga___ Atari___ BBC___ Archimedes___
Spectrum___ Other (name) _____

4c Which Hardware/Software do you use:
Dartcom___ ICS___ Maplin___ Martelec___ Spacetech___ Timestep___
Comar___ Quorum___ Other (name)_____

5 If you use a Personal computer for weather satellite work, for what applications:
Display___ Predictions___

6 For UK members only
Do you object to your name and address & phone details
a) being held on a computer? Yes___ No ___
b) being given to RIG members in your vicinity? Yes___ No___

7a Do you suffer from any forms of interference?___

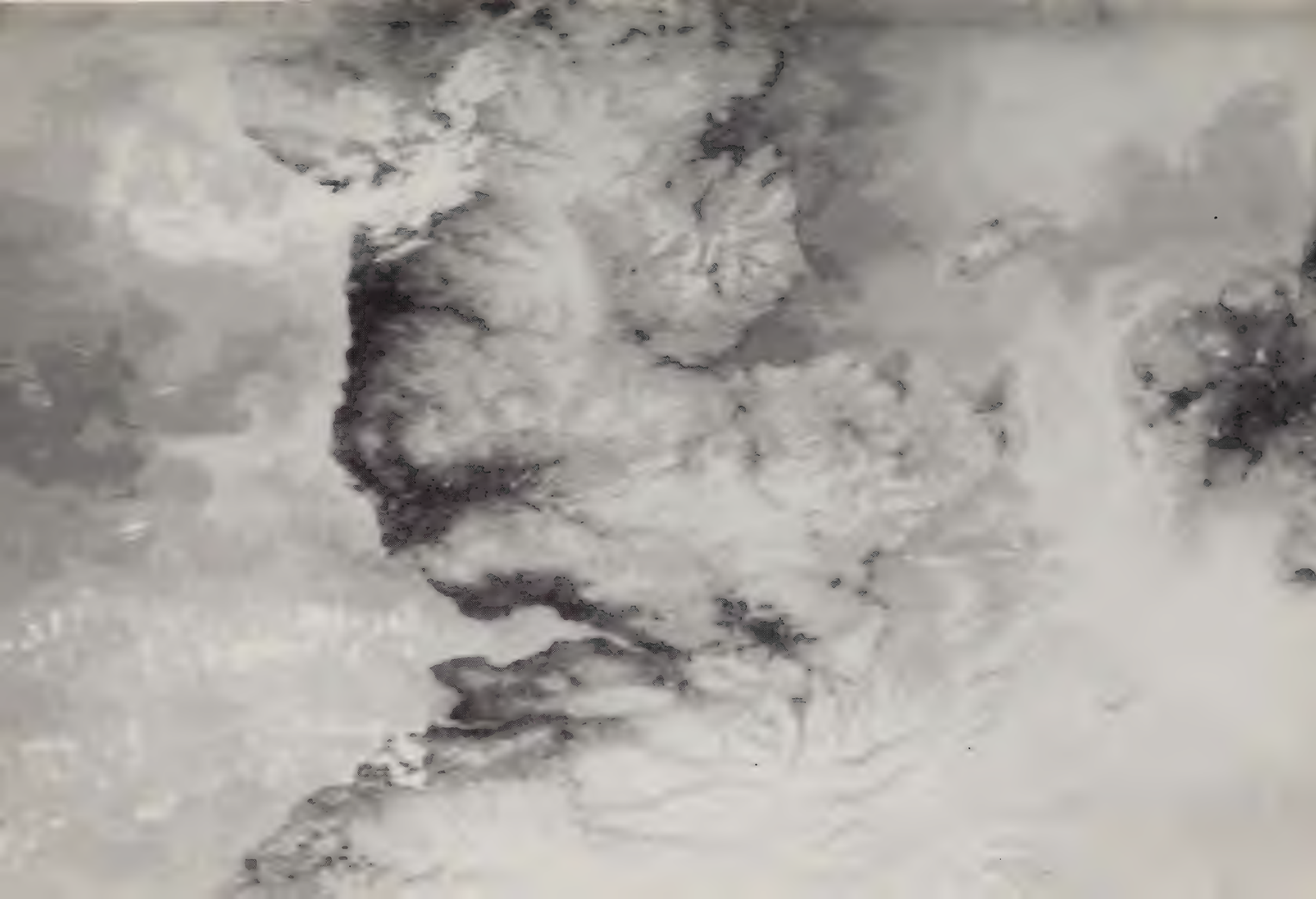
7b If yes, has it changed since the last survey?: Improved___ Same___ Worsened___

8 RIG MAGAZINE:
Which Rig items would you prefer to see..... less/same/more
a) constructional articles ___ ___ ___
b) members letters ___ ___ ___
c) members experiences ___ ___ ___
d) reviews of hardware and software ___ ___ ___

9 Which of these features do you make use of?
a) Kepler elements___ b) Reference orbits___ c) Noaa predictions___

10 a) Have you a computer fitted with a Modem?___
b) Will you be using the RIG Bulletin Board?___
c) What do you want to see on the Bulletin Board?_____
_____

11 a) Your Occupation? _____
b) Are you involved in Education?___
c) Any specific skills you possess?_____



which Marc Blewitt monitored and informed us that the orbit time was 8 minutes shorter. So we then entered the new Kelso elements and re-ran the prediction sequence from 08:35 GMT. This revealed that the new times coincided with the earlier pass. This concluded for us that SAT A was MET 3/4, the subsequent orbit at 10:39 GMT confirmed this.

From this information we deduced that Len Maxim had the old set of MET 3/4 elements and did not know of the manoeuvre. We reported this information to Geoff Perry who confirmed our results and noted that he had an error in his data files which he has now corrected.

DUNCAN WALL, DAVID SALISBURY

METEOR 3/4 ORBIT MANOEUVRE

At 08:45z 4/10/91 a 240 line per minute Meteor 3 series satellite was observed transmitting a visible image on 137.3MHz with 12 sync bars. The observed image groundtrack was from North Africa to near North cape (Norway/Sweden) and LOS occurred at 09:01z. Cross checking with the computer predictions indicated that the only groundtrack which fitted was that for Meteor 3/4. However, the AOS times were in error by some 8 minutes. Estimates were made for the time of the next orbit as being approximately 10:30z and observations were made at this time. At 10:32z the same satellite was heard with the same characteristics and synch bars. Visible image of Eastern North Atlantic to Iceland with a confirmed SSP of 75'N 10'W at 10:49:15z. Frequency was again 137.3MHz. LOS occurred at 10:50z.

A rough prediction curve was plotted which gave an orbital period of approximately 109 minutes. With the next orbit being at approximately 12:26z. From observations made at this time, (AOS 12:27 LOS 12:42 north bound Mid Atlantic to Greenland), it was concluded that this fitted Meteor 3/4 groundtrack but not time. This information was passed to Geoff Perry of the Kettering Group and a new element set for Meteor 3/4 obtained. This new element set confirmed the new orbit groundtrack and time.

By interpolating the 'old' element set with the 'new' element set on our computer prediction programmes it was concluded that some manoeuvre or orbital change had been implemented (deliberately or otherwise),between 12:00z 25/9/91 and 14:00z 25/9/91. This had resulted in a decrease in satellite altitude and the AOS being earlier. At points close to the change

the error would have been relatively insignificant and hence unnoticed. However at present (9/10/91) the error has increased to some 12 minutes. This would lead anyone with an old element set to miss Meteor 3/4 completely. At the time of this report Meteor 3/4 continues to operate normally and the scanner synchronisation problem of the period beginning 22/9/91 to 04/10/91 appears to have been corrected. The reason for the orbit changes is as yet unknown but may be linked to the above scanner problems.

Marc Blewitt 09/10/91

FOR SALE...

TELEQUIPMENT D43 OSCILLOSCOPE, 15MHz Bandwidth, with manual £45.00 + P&P

ALTAI OST5M TRANSISTORISED OSCILLOSCOPE, 5MHz Bandwidth, 115v £70.00 + P&P

100kHz OSCILLATOR BLOCK with Decade Counters, 50Hz TTL Output £6.00

TOSHIBA PHOTOCOPIER, Fully Working, uses plain A4 paper, with Manual, good for Photographs, £85.00 Buyer Collects (Heavy)

GNOME BETA2 BLACK and WHITE ENLARGER £20.00 + P&P

Graham Smith, G1JVZ (081) 857 3106

THE VHF RECEIVER

Roger Belcher

INTRODUCTION

This article is intended to :

1. consider the problems facing polar satellite (APT) reception;
2. describe briefly the architecture of the usual APT receiver - the superhet;
3. review the parameters used to specify the superhet receiver;
4. explain how inadequacies in the various receiver sections create problems in APT applications;
5. develop a specification that will meet the needs of current and future APT receivers;
6. "point the way" as to how this specification can be achieved using readily available r.f. components and conventional receiver construction techniques.

For as long as I can remember I have been interested in the weather and radio electronics. Recently, having had some time and money to spare I decided to set up a weather satellite receiving system. For convenience I purchased a pre-assembled pre-tested receiver pcb and pre-amplifier from one supplier and a decoder and crossed dipole antenna from another. Through the years, I have collected a number of BBC computers and so decided to devote one to this application. The receiver was tuned using a "free running" voltage controlled oscillator and so to improve the stability and to make it easier to operate I completed a phase lock loop using an MC145152.

After installing the antennae, assembling the system, I switched on. I was rather surprised to discover at this point that weather satellite systems used the same modulation method and data coding as pagers. After reading about WEFAX and APT, I found that they did not, it only sounded as though they did. Pictures were not much in evidence.

I decided that if I was going to achieve satisfactory results I would have to redesign some of the vital links in the system.

Receivers designed to operate in the VHF band (30 MHz to 300MHz) have to cope with an increasing amount of RF pollution. Mobile radio applications

have long recognised the need for robustly engineered receivers to work in crowded spectrum conditions.

The explosive growth in all aspects of commercial communications have placed a premium on the availability of RF spectrum. Mobile radio channel spacings are coming down from 25 KHz through 12.5 KHz and onto 6.25 KHz. The shortage of qualified RF personnel has meant that not all equipments in use are maintained rigorously within their design and operating specification. The result of this has bought powerful signals to the edges of the VHF weather satellite band and in some cases even into it. Popular polar orbiter satellite frequencies are: 137.30, 137.40, 137.50, 137.62, 137.85 MHz

Mercury Paging and Vodapage between them use various frequencies above this band but one of particular interest is 137.975 Mhz. Base stations at this frequency radiate a power of 100 W (+50 dBm).

From this information we can see that the lowest pager frequency is only 125 Khz away from the highest APT frequency. This means that the APT receiver has to work adjacent to some very powerful signals. It is worth considering in some detail the most common receiver configuration used for APT reception, the superhet.

Receiver Fundamentals

The principles to be discussed apply to both AM and FM receivers.

The APT information has a frequency of 800 Hz to 4,000 Hz (2.4 KHz +/-1.6 KHz). If 137.5 MHz is taken as the carrier frequency and 3.2 KHz (4000 - 800 Hz) as the information bandwidth, it is seen that this ratio is 43,000 to 1. To resolve such an extremely small portion of the RF spectrum in one processing step in order to extract the modulation, would require the carrier to be processed with an extremely high degree of accuracy and stability. A more practical approach is to change the carrier at an early stage in the receiver from its 137.5 MHz down to a lower frequency for processing, but with the modulation unchanged. In this way a more manageable frequency is used from which to extract the modulation. The method used to convert the incoming RF carrier to a lower frequency is to mix this carrier with a second frequency which is generated within the receiver itself. This second frequency is referred to as the Local Oscillator (LO). The circuit element which is used to mix or to beat the two signals

(carrier and LO) together is called the Mixer. The resulting lower frequency produced is known as the Intermediate Frequency (IF) because its frequency lies between the carrier and the demodulated output. A receiver which uses this technique of beating (or heterodyning) two signals together is called a Superheterodyne or Superhet receiver. It is this receiver type which is currently used for most APT work and the type which we will consider in some detail.

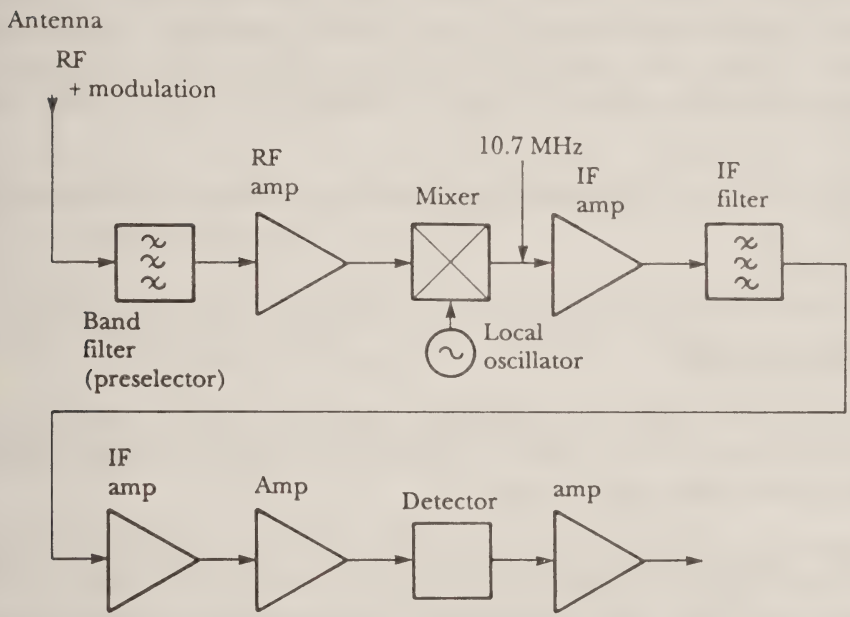


Fig. 1 shows a typical superhet block diagram. The antenna is connected to a pre-select filter. This stage matches the impedance at the base of the antenna into the receiver and provides some defining of the frequencies seen by the receiver - it has selectivity.

The output of this filter is matched into the next stage, the RF amplifier. This stage amplifies the extremely small signal appearing at the output of the pre-select filter (typically less than 1uV) to a level suitable for feeding into the next stage - the mixer. The mixer has 2 inputs:

1. the RF carrier from the pre-selector and
2. the frequency produced by the LO.

The mixer will have at its output a frequency which is a function of (1) and (2) and this IF (typically between 400KHz and 22 MHz) is matched into the next amplifying or matching stage. Following this the signal passes to the IF filter. This filter is the prime component used to narrow the bandwidth down to the few kilohertz of carrier (now at IF) and sidebands. Note that the frequency on which the filter is centred is the IF, but that its bandwidth is only a few kilohertz wide.

After the filter there are several stages of gain, (IF amplifiers) to raise the signal to a level (limited) suitable for the modulation detector. The detector recovers the required audio frequency (2.4 KHz), passes it through a bandpass filter and after amplification, presents it to the next part of the system.

We will now examine the performance of some sections of the superhet in detail.

RF AMPLIFICATION

A prime receiver parameter is sensitivity. This is a measure of the lowest signal power that can be applied to the receiver front end for an acceptable signal to noise ratio at the output.

In a well designed receiver the noise performance is a function of the first gain device and all losses before it. This means that the RF amplifier should have very good low noise performance. This is primarily controlled by the choice of active device, the current through the device and losses due to its input matching. However, we also need to consider its action under large signal conditions.

We have already said that very high power, unwanted signals will pass through the pre-select filter to the input of the RF amplifier. If the RF amplifier has insufficient large signal handling capability then intermodulation products (IMPs) will be generated within the amplifier itself.

The products result from the device being forced into non-linearity and acting as a modulator. The most troublesome are the third order products. Third order distortion products are important (and catastrophic) because they can be generated at a frequency equal to or very close to the wanted frequency.

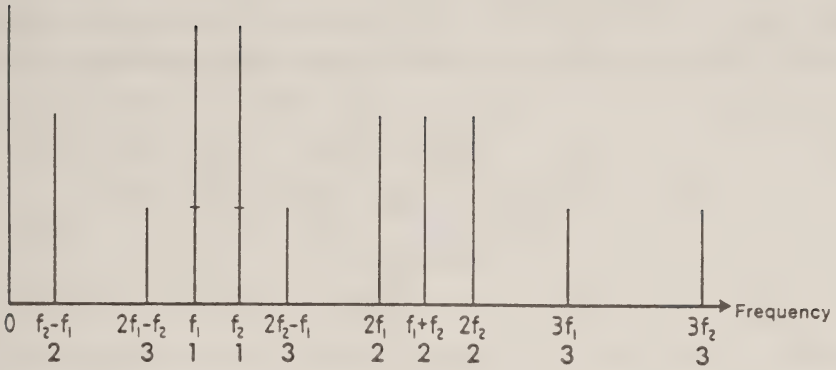


Fig. 2 shows the relationship of the products where :

1 = input frequencies

These are not usually of the same amplitude, i.e. one is large and unwanted and one is small and wanted.

2 = second order products

These are further away from the wanted signal.

3 = third order products

These are close to the wanted signal.

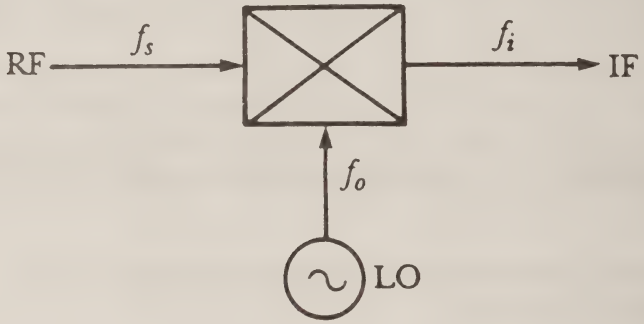
If this happens they will be converted through the mixer into the IF passband. Once in the IF passband, no amount of further filtering will remove them. It is necessary, therefore, that the RF amplifier is designed to be able to handle the largest signal level that will occur at the receiver input in the pre-select passband.

N.B. There are some very large signals about!

It should be realised from this the danger of using a pre-amplifier ahead of the receiver without very careful consideration. Most modern receivers perform better without a pre-amplifier than with, especially in high signal level areas. If a pre-amplifier is used, it should only compensate for cable losses in antenna feed systems.

THE MIXER

The object of the mixer is to mix, or beat, two input signals together to produce an output that is a function of these input frequencies. Fig. 3



The output that we require is the IF, the lower than carrier frequency carrying the modulation. This is produced by the mixer subtracting one input from the other, note that it also adds the two frequencies.

i.e. mixer output fi = fs +\- fo

Where fi = IF

fs = RF input (after amplification and filtering)

fo = LO

The ideal mixer should fulfill certain criteria:

1. Have a transfer function that contains no terms higher than second order (i.e. exhibits a square-law characteristic). This is to prevent the mixer itself generating frequencies other than the sum and difference.
2. Have a conversion gain rather than a conversion loss - to improve the noise performance of the receiver.
3. Have a high degree of isolation between any two ports of the device - to prevent unwanted interactions.

As mixers in practice do not have a perfect square-law characteristic other products are output as well as the desired frequency.

If we first consider the input as a single frequency, i.e. just one satellite signal with no other interfering signals we can examine the action of the

mixer. In order to achieve a mixing or frequency conversion process the mixer must be a non-linear device. The desired output signal at fi is:

fs + fo or fs - fo

i.e. the sum and difference frequencies

RF input (wanted) = fs

LO frequency = fo

Mixer output = fi

fi = fo +/- fs

e.g. if fs = 137.5 MHz, and fo = 126.8 MHz

fi = fo + fs = 264.3 MHz

fi = fo - fs = 10.7 MHz

10.7 MHz is the frequency that will be selected by the IF filter for further amplification and demodulation. If the receiver IF (fixed by the IF filter) is 10.7 MHz and the local oscillator is 126.8 MHz then the mixer will convert 137.5 MHz into the IF passband.

There is however another input frequency to the mixer that will be translated down to the IF (10.7 MHz). This second frequency is

LO - 10.7 MHz i.e. 116.1 MHz

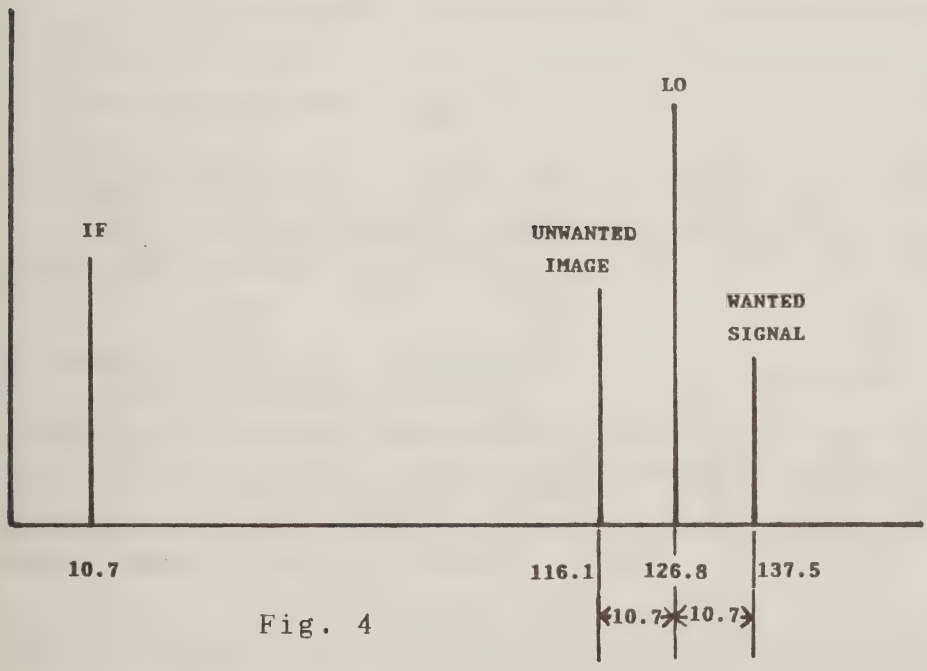
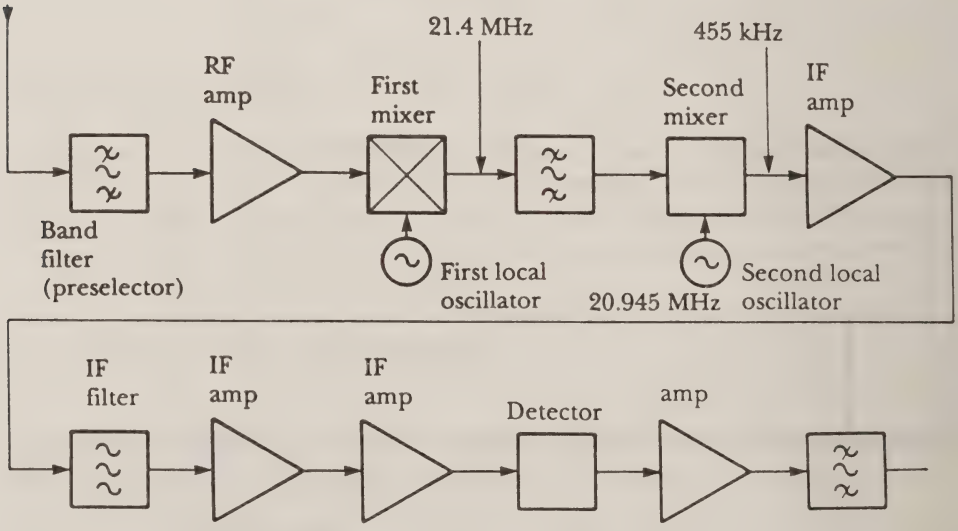


Fig. 4

It can be seen from fig. 4 that this frequency lies on the opposite side of the LO to the wanted signal frequency, hence it is called the Image Frequency. To restate the problem, both 126.8 MHz + 10.7 MHz = 137.5 MHz and 126.8 MHz - 10.7 MHz = 116.1 MHz are converted into the IF passband. The receiver has no way of comprehending which of these two is the wanted frequency and so will attempt to demodulate both. The only way to prevent this image frequency entering the IF and hence the detector is to prevent the unwanted frequency from reaching the mixer in the first place. This is a prime function of the front end filtering of the receiver. The pre-select filter (and any other filtering circuits before the mixer) must have sufficient attenuation at the image frequency to enable the receiver to meet its specification. A typical receiver image rejection specification might be 75 dB (image relative to wanted signal). Examination of the figures will show that 137.5 MHz - 116.1MHz = IF x 2. It follows, therefore, that the higher the IF the further away is the image frequency and hence the simpler the front end filtering. However, we will see in the next section that we require a very narrow bandpass characteristic from the IF filter to maintain adjacent signal performance and remove any other unwanted signals. This becomes more demanding as the IF rises - the design engineer is caught between two constraints. The classical superhet approach to the problem is to divide the difficulty across more circuit elements. A technique is used that is referred to as a "double superhet" configuration. Fig. 5



In this technique the first mixer produces a relatively high IF (21.4 MHz is quite usual). This means that the image will be 21.4 x 2 = 42.8 MHz away from the wanted signal. The design and number of the pre-select filter stages can be reduced, hence the component count and setting up time is kept to a minimum.

Further down the chain a second mixer is used to produce a second IF. The filter between the two mixers can be simple in design as the wanted and image frequencies are fixed. Due to the "soft" all enveloping shape of this filter it is often referred to as a "roofing" filter.

The second IF will be as low as possible to ease the main selective filter design - 455 KHz is a common choice. This can then be a tuned LC filter rather than a more expensive crystal filter. Similarly the FM discriminatory is rather easier to implement. There are, of course, compromises:

1. The receiver is more complex increasing current consumption and decreasing reliability.
2. The receiver with more components is physically larger.
3. There are now 2 oscillators within the receiver giving more problems of drift and instability.

4. The increased number of different frequencies within the receiver have much more potential for intermodulation products to be produced - both in band and out-of-band.

5. Due to the large number of stages between the antenna and the high selectivity filter it is very difficult to attenuate large close in signals. This means all stages up to this point must have a wide dynamic range (i.e. good linearity).

FILTERING

We have said that the closest pager frequency is only 125 KHz away from our wanted signal. If we are to prevent this interfering signal from reaching the detector and hence capturing the receiver, it must be severely attenuated by filtering. Let us examine where this filter can be placed in the receiver system.

We have a filter at the front end of the receiver, i.e. between the antenna and the RF amplifier. As we have seen, losses before the first RF amplifier

directly increase the noise figure. To prevent this effect the pre-select filter must have low loss (less than 1 dB) at satellite frequencies i.e. 137.85 MHz. However, we require to attenuate the strong pager signal by many tens of dB, but this is only 125 KHz away. It would be very difficult if not impossible to implement a filter of this required shape factor using conventional techniques

To obtain the best signal to noise performance of the receiver, we require an IF band width of 46 KHz (this figure will be derived in Part 2). So, we might specify an IF filter at 10.7 MHz to have a 1 dB bandwidth of 46 KHz and be 60 dB down at 10.825 MHz (10.7 + 0.125) and 10.575 MHz (10.7-0.125).

For the same reasons demonstrated in the pre-select filter consideration, it is very difficult to realise this as a discretely constructed filter and commercial filters, ceramic or quartz, are not available with this bandwidth and tolerance together.

To realise the necessary filter characteristics without paying an unacceptable price, it will need to be realised at a lower IF, e.g. 455 KHz. At this frequency, a simple three stage LC filter will be found to give an outstanding performance.

SUMMARY

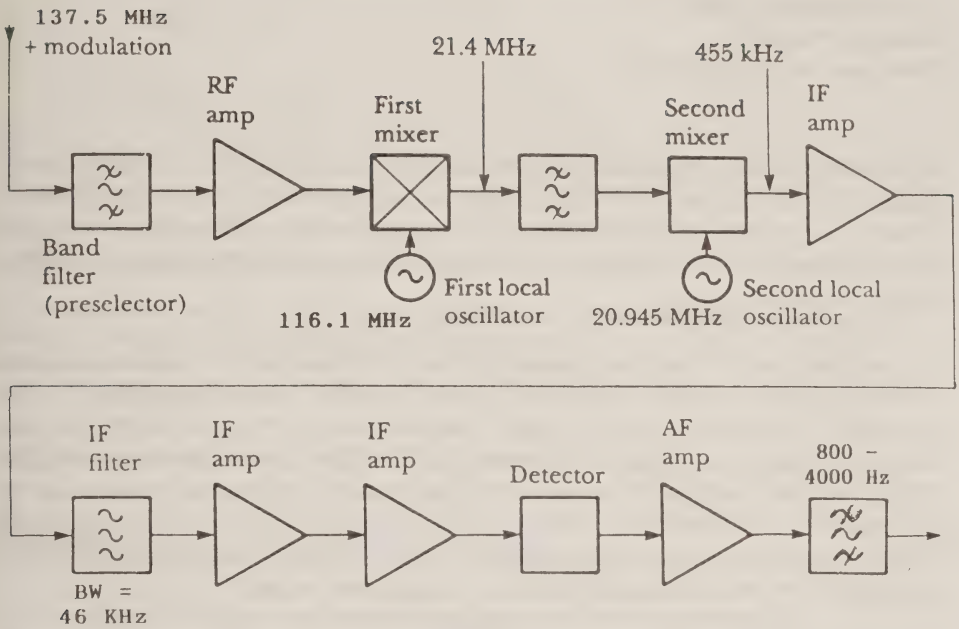
We have examined the technique of translating the RF carrier complete with modulation down to a lower frequency, the IF.

We have seen that powerful interfering signals are very, very close to our wanted signal frequency.

We have demonstrated that the only repeatedly low cost way of filtering out these unwanted signals is to place the main selective filter well down the IF chain at low frequency, 455 KHz.

We have seen that in order to make this approach work, all stages in front of this filter must be capable of handling these large interfering signals without themselves producing intermodulation products.

Fig. 6 shows a suggested receiver configuration based on the above considerations.



In the next article we will quantify these requirements to arrive at a high performance APT receiver specification and consider circuit techniques that will give the required result.

Roger Belcher has a background of 25 years in the RF communications industry, including an apprenticeship at Marconi Instruments, design of radar processing equipment for Plessey Radar, Applications Marketing for Texas Instruments, low noise satellite receiver design for Racal and receiver hardware/software design for Rhode & Schwarz (Germany).

Co-author of *"Mobile Radio servicing Handbook"* - Heinemann Butterworth, UK and *"Data over Radio"* - Quantum Publishing, USA.

He is now an International Consultant to an RF Training Company specialising in new technologies.

A COMPUTER ASSISTED PHOTO FAX SYSTEM

Guido Emiliani, I4GU
Claudio Pagnani
Marciano Righini, I4MY

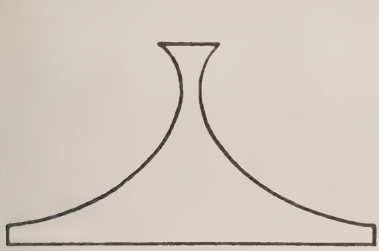
The results of our photo fax system are to be ascribed to a Muirhead-Jarvis Picture Receiver type D-356-B, a huge vintage machine built in the 1940's. There are two racks of electronics with vacuum tubes, of course, which still work properly, and a console which looks like an upright piano or a lathe when you open the lid.

Inside the console there is a projector lamp whose light is condensed onto an oscillograph mirror. The video signal tilts the mirror according to the intensity of the audio tone applied. The reflected light from the mirror falls on a shaped aperture (fig.1). Movement of the light causes the beam of light falling on the aperture to move from side to side and hence the amount of light passing through the aperture will change. This variable brightness beam is sent, by means of two mirrors, to an objective lens assembly which focuses it on the sensitized material fixed to the drum.

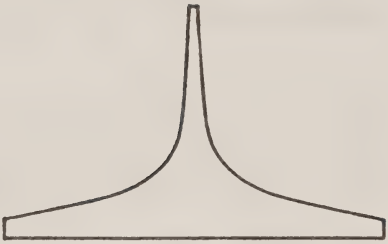
The drum of our machine has two possible speeds: 1 and 2 turns per second. Modifying the gears of a fax machine is uphill work; it is necessary only if you want to print real-time pictures from the satellite and the drum turns at a speed different from the line rate. Instead the speed of the drum has no importance when you print pictures stored in the computer mass memory. All you have to do is drive both the machine motor and the computer with an external clock so that the computer sends the data to the fax machine at a rate determined with software. Our drum always rotates at 2 turns per second, not only for NOAA's or METEOR's, but also for METEOSAT and OKEAN or the 6-line-per-second HRPT pictures. By supplying the system with a different clock frequency (4800, 2400 or 1200 Hz) you choose the format of the image you want to print, i.e. the whole picture or part of it, and the computer establishes how many pixels per line, how many lines and how long the line should be in order to maintain the proper aspect ratio taking into account the rotation speed of the drum and the traverse speed or index of cooperation.

The hardware to do the job is described in our article 'Storing Weather Pictures on Disk' in RIG Newsletter No.24 , pp. 25-38. The related software is available free to everybody.

Fig.1 - Shapes of the reception apertures



Positive reception aperture (paper)



Negative reception aperture (film)

The shapes of the various receiving apertures have been determined taking into account the gamma of the sensitized material, a numerical indication of the degree of contrast in a photographic image.

ANSWERS TO THE CROSSWORD IN RIG26...

1 C	A	2 C	H	3 E	■	4 C	H	5 A	P	6 S
O	■	O	■	7 V	8 I	A	■	N	■	P
9 C	O	N	N	E	C	T	L	I	N	E
O	■	S	■	10 S	O	S	■	M	■	N
11 A	12 N	T	13 S	■	N	■	14 M	A	15 S	T
■	16 I	R	I	S	■	17 M	U	T	E	■
18 S	T	U	N	■	19 K	■	20 M	E	T	21 S
I	■	C	■	22 P	I	23 E	■	D	■	I
24 M	O	T	H	E	R	B	O	A	R	D
O	■	E	■	25 N	I	B	■	P	■	E
26 N	O	D	E	S	■	27 S	I	T	E	S

SHAREWARE CORNER...
By Mike Goodall

Just a couple of new programmes turned up this time; the fist an update of the old version of GWS, presented on a cover disk with one of the Computer magazines last year. This version given away with Computer Shopper, Dec. 1991 edition. The second an update of the popular Traksat programme.

GRAPHICS WORKSHOP 6.0

A shareware program which many of you may remember, but greatly enhanced. It copes with many picture formats, i.e. GEM/IMG, PCX, GIF, TIFF, WPG, PIC, WINDOWS 3 BMP, EPS, AND MSP. Setting up can be tricky. Make sure that you set up the extended memory and screen drivers to the 'Super VGA & others' mode, if you have SVGA, etc., and select the right driver file. After this it's all plain sailing, although loading pictures is painfully slow compared with VPIC, etc. It contains all the new image processing: Soften, sharpen, smudge, colour reduction, grey-scale and Spatial Posterize (produces pics as seen on the TV (big squares) where people don't want to be recognized! It can also flip and rotate, and has a variety of dither processes. Scaling between 1 and 100% is available, as is conversion between any of the formats. It also has the ability to convert full colour pictures to black and white clip art. On top of all this, it contains Printer drivers for the modern HP Lasers and Postscript printers. All in all an impressive package, which makes up for it slow display mode. It is available on Library Disk 99.

TRAKSAT V2.75

An update of the popular tracking programme that uses the co-processor, if fitted, which makes execution fast. Generates tabulated output of predictions, as well as a real-time world screen for multiple satellites.

Remember, shareware is not free. If you use it, register it! This helps to promote updates from the authors. Another bonus is the User Manuals normally sent when you register; they normally contain a mine of useful information. In addition, the authors will normally try to sort out any problems that arise with their programs when used with your specific set-up.

Dear OM,

I was very interested to read in RIG26 of your new GIF picture library scheme. I must congratulate you on this brilliant idea and would very much like to take advantage of your kind offer.

David Wilkins, Middx.

Dear Ed,

An error slipped into ARCHIVE.BAT in the last magazine.
LINE 8 should be LHA A %1 %1.DAT

If anyone is having trouble finding a copy of LHA.EXE, they can send me a disk and return postage and packing materials, and I'll send them a copy. I'll also enclose the batch files I wrote, and versions for PROSAT2 archiving (very useful because you can get a file >1.44 Mb onto a disk! It compressed a 1.7Mb file to 950K.)

Last time I said you could get 3 files onto a 1.2 Mb disk, now I've used the programme many times, I find that PCSAT3 files can normally be compressed to between 250k and 350k. This means on average you can archive 3 or 4 files onto a 1.2Mb disk, or 4 or 5 files onto a 1.44Mb disk, and there's normally room for LHA.EXE also for future use.

A couple of RIG's ago I offered a copy of my weather satellite tracking programme written in GWBASIC. A few people took up the offer, unfortunately there were a few bugs in it and if they send me the disks again I'll replace it with the updated version (now includes better maps and corrects for drag and other added features.) If anyone else wants a copy, just send me a disk and return postage and packing materials, Please let me know of your PC system. E.G. CGA, EGA or better, PC emulator on Archimedes, Nimbus etc. (>720k are recommended, but I supply a 360k version).

Gordon Train
52 St John Street, Keswick, Cumbria, CA12 5AB

Dear Ed,

I'm still on the trail of cheaper paper for FAX machines, home built or otherwise. Echo sounder paper is also sold direct by Sensitised Coatings at King's Lynn;
8.5" x 100ft. is £12.50 + £2.75 p&p + VAT = £17.92 total
4" x 10m is £2.50 + p&p +VAT
4" x 15m is £3.50 + p&p +VAT
Phone 0553 764836.
Much cheaper than those in my last letter, and no, I'm not a shareholder of this firm!

Correction time:
The A4 paper for KD211 and Rank Xerox 400 is electrosensitive, not electrostatic as printed in RIG 26. Electrosensitive paper has a current passed through it and burns off the white layer to reveal black carbon, making a pong in the process. Electrostatic paper has a charge deposited on it, then passes over dry ink powder (toner) mixed with iron filings (developer) on a magnet. Ink sticks to the charged parts and is fused on when the paper passes over a heater. Much like in a photocopier. Errors inevitable creep in here and there when deadlines are close and I send in seven pages of hand printing! (It doesn't help that no-one can read it!) I am now trying to get everything typed up or put on a floppy disk - thanks to my wife!

John's Radio at Birkenshaw, Bradford have sold cheap MUFAX machines and paper before and are worth mentioning here.
Phone 0274 684007.

After searching for over a year for the cheapest brand new video printer, I talked to Dave Cawley (Committee member) on the RIG stand at the Leicester Rally. He can supply small Mitsubishi video printers for £320 + VAT - do you know of cheaper? Similar units I've had prints from, make almost photographic quality black and white prints from video cameras, video recorders, computers (with PAL output) and framestores.

While there, I asked why there is thousands of pounds worth of APT and HRPT equipment on show, and never a single hard copy unit, so that people can take away a picture in their hand, to marvel at when they get home. Can't this sophisticated hardware and software be used to feed an old FAX machine of any standard (120, 180, 240 RPM, AM or FM), or even the brand new group 3 ones on sale around the Granby Hall?

The team suggested it could be done and I should mention it here in case someone wants to try it, or do an article themselves.

Talking of printers, I have a hand held copier that looks like a big shaver and uses thermal paper. It makes a very sharp copy of whatever you pull it over (cost under £30 from Dixons a couple of years ago - now discontinued, I think). Silver Reed also did a similar one. Are they any good for isobar charts? What would you need to get something out of it? (Mechanical or electronic modification).

Where have all the NE561B I.C.'s gone (Phase Locked Loop). Does anyone have one lurking in their junk box? Years ago I wanted one and all of a sudden, they were like hen's teeth, I've never seen one. This was the FM I.C. for years and I've got many diagrams that feature it. Drop me a line if you've got a spare one that's not too dear.

Henry Neale once mentioned that he had cheap recording oscilloscopes, in his waffle page, using fibre-optic faceplates to channel the light to the photosensitive paper which is fed past the output ends. They are Techtronic 4631. They can be used for optical, or infra-red mapping (similar to weather sat, radiometer), sonar, radar, chart recording, spectrum analysis and facsimile (ideal for NOAA pictures etc.). He does have a manual but it takes someone with the will to get all the sections working together properly. Anyone interested?

Honeywell in Bracknell sell recording oscilloscopes (over £10,000, too dear for most amateurs) and special light sensitive paper that gives near instantaneous printout in their equipment. It might be useful for Henry's machines if other sources are difficult to find. From the price and uses mentioned you can see that this kind of machine is worth having a go at. Paul Yearsley (G1UTM) told me he tried the Telecopier 400 conversion from RIG 13, and it didn't work properly. Alan Sammons (G0EAG) told me of some errors which were not corrected later, that may account for this.

1. In fig 1, the diode between the output of IC16a and the input of IC13e should be reversed.

2. In fig 1, IC3 pins 5 and 8 should be earthed.

3. In fig 1, IC14c input consists of a CR circuit, with R16 connected to the supply and C23 connected to earth. These should be the other way round. I.e. C23 should be connected to the supply and R16 to earth.

4. During testing he found that he couldn't get a decent frequency swing using TC1. This was remedied by removing C2.

5. With the original components in the PLL circuit of IC7, he found that using the internal 24000Hz sync oscillator the PLL locked easily for all speeds, but when using an external sync, the PLL never locked. This was due to two reasons. Firstly, the input for the external sync was too insensitive, so he added a small amp before the input to IC13b. Secondly the PLL reacted too quickly to any change in frequency of the external sync causing the PLL not to lock and pictures to slope. He overcame this by changing the components in the low pass filter section of the PLL, (R7 and C6) by trial and error. He increased R7 to 270k and C6 to 4 x 10uf tantalums in parallel. You may need to make these values different.

6. He found that when switching to invert, the machine started up on its own. This was caused by the negative going voltage from the video processor amp in fig. 2 to operate the transistor in the carrier detect circuit on board A6 in the machine. Removing the last transistor in the CD circuit on board A6 solved the problem.

If you've found any more, please send them to the newsletter so that everyone can take note.

Recently I've been trying to clear some workspace in my shack to do some circuit construction. I sympathise with Henry's effort in a previous waffle page (I wonder if I should have one). Clear floorspace and worktop is very hard won and very easily lost.

Mickolajczyk's law (G4ZRE) states that the amount of clutter you have expands to fill the worktop available. How true!

Graham Smith (G1JVZ)
91 Oakdene Avenue, Chislehurst, Kent BR7 6DZ Tel: 081 857 3106

Dear James,

I read with interest Dave Cawley's article "Noise Figure...Fact or Friction" in RIG26. By the time I'd reached the second paragraph I was beginning to wonder whether I'd reached the fiction - sorry, friction - part already. I could barely contain my excitement as I read on...

It seems that whilst the rest of the world was contending itself with semiconductors based on Silicon, and Gallium arsenide technologies, Mr. Cawley was way ahead of them with his experimental cannabis-based device. This has resulted in a new microwave device, called the 'HEMP'. Details of its performance are a little difficult to come by at this stage, but one report suggests that you can achieve virtually any noise figure you desire by smoking one!

In case this could be a cruel joke, I checked the almanac to see if this was possibly the April edition of RIG that had just reached me, and no it wasn't! It must be true then. Thank you RIG for bringing us the story first - we are apt to complain about the Newsletter being late, but when it does arrive its mind-blowing.

Chris Pretty, Alton, Hants.

Dear Mike,

Regarding your article in RIG26 on the GIF Picture Library... Have you any pictures of Africa or Australia?

Thank you very much for making this service available.

Brian Metherell, Ealing

[We have been promised some from S.Africa, but none from our Aussie friends. Come on...stop watching Neighbours and send us some pics! Mike]

RIG AT RALLIES...

Below is a list of rallies attended by RIG last year. We hope to see you again at these events this year, but at present, of course, it is too early to get confirmation of bookings and dates.

March	Pickets Lock
April	VHF Convention - Sandown
April	BATC - Harlaxton Manor
May	Harrogate - Northern Rally
June	Elvaston Castle
June	Longleat
July	York
August	Woburn Abbey
August	BATC - Sandown
September	Peterborough
October	Leicester

We are always pleased to see volunteer members at these events, especially those who live local to the event, who can help on the stands, and give the regulars a small break.

If you are in doubt over any event, give the Chairman a telephone call.

RIG BULLETIN BOARD

By the time you read this the Bulletin Board should be up and running on 0945 85666. It will be available 24 hours a day, 7 days per week.

The maximum baud speed is duplex 14,400, and it is downwards compatible.

RIG HELPLINES:

General Enquiries Meteosat information NOAA information Supplier Complaints	John Tellick	081 390 3315
Russian, Chinese satellite information/status	Les Currington	0707 326058

Schools/ Educational Enquiries	John Murray	Torquay	0803 217490
	Frank Bell	Godalming	0483 416897
	Tom Walter	Reading	0734 871330
	Bob Coombes	Haslemere	0428 642930
	John Din	Bristol	0454 773387

Framestore Technical Support	Mike Coombs	0530 243494 7.30pm - 9.30pm

RIG MICRO SPECIALISTS:

BBC Micro	Enquire via John Tellick	081 390 3315
Commodore Amiga	James Brown	0656 782632
Atari ST, Archimedes	Peter Newman	0487 812121
PCSAT3 and PROSATII	James Brown	0656 782632
HRPT and Primary Data	Dave Cawley	0440 820040

Meteosat Downconvertor:-
a) Assembled and tested module in tin plate box:- ... £147.00
b) Complete mounted in weather proof box:- £183.00
Waterproof power and channel change connector £10.00 extra if required, but note these functions can all be done via the coaxial downlead.

RIG VHF Scanning Receiver
a) Basic receiver module, with LED Channel number display, fully assembled and tested £128.00
b) Same module as above but with liquid crystal frequency display module replacing the LED Channel display £169.00

The **RIG VHF preamp** also available includes a bandpass filter and is ideal for mast-head mounting. It is available from the Chairman as a built and aligned PCB measuring 85mm by 33mm (3 5/16 x 1 15/16 inches).
Module including first class post £16.00

28 page booklet entitled: Introduction to Weather Satellites & their Reception by Mike Mansfield £2.50

Low noise Amplifier Kit
All enquiries regarding availability, etc. to the Chairman ... £28.00
David Juett YU3 i/f s/w for IBM PC & clones £6.50
Dishes, 1.6 metre £48.00
Dishes, complete with Feed horn and mount, plus Dish mount to 2" pole, inclusive in price, Nearly new cond. 90cm active area ... £70.00
ditto 100cm active area ... £75.00
We do not normally despatch dishes because of expense. It may be possible, in certain circumstances, where it would be done at cost.

ALL ITEMS ABOVE ARE AVAILABLE FROM THE CHAIRMAN
All cheques payable to "Remote Imaging Group" please

Rig Binders
Available by post from Gordon Fleming, 168 Bythway, Welwyn Garden City, Herts. AL8 1DU. Price £4.00 each, including P&P.
All Cheques payable to "Remote Imaging Group" please

RIG - Timestep PCSAT III

A small half sized PC card that will allow the display on IBM PC type computers of APT signals from Meteosat, GOES, NOAA and the Soviet polar Meteor and Okean satellites.

Card type	Half card 8 bit, plate through solder resisted
RFI	FCC part 15 and 1992 EMC compatible
Input	Two separate inputs, 100mV 10K ohm audio (adjustable)
Source	Live or from tape (no sync track needed)
Synchronisation	Derived from subcarrier on Meteosat, GOES and NOAA. From digital signal processing (DSP) on Meteor and Okean. No computer timing or calibrations used (or needed).
Resolution stored on disk	600 pixels 800 lines and 256 intensity levels
Zoom	To pixel resolution regardless of video card
Acquisition	Fully automatic on Meteosat and GOES (any PC). Fully automatic NOAA, Meteor and Okean live or tape (VGA, 286 and above only)
Printing	High resolution HP LaserJet (and clone) driver
Power	Supplied from host computer
Colour	64 greys or 256 colours from colour routine supplied
Contrast	Stretch or compression in linear or non linear
Display resolution	800 x 600 256 colours VGA
	640 x 480 256 or 16 colours VGA
	640 x 400 256 colours VGA (Paradise, Amstrad and Atari)
	320 x 200 256 colours VGA (display only, receive in 640x480x16 mode first)
	640 x 350 16 colours EGA (not NOAA or Soviet)
	320 x 200 4 colours CGA (not NOAA or Soviet)
	640 x 200 16 greys Amstrad 1512 (not NOAA or Soviet)
Cards supported	Any IBM register compatible card
	Tseng Labs chip set (Orchid, Sota etc)
	Paradise (Amstrad, Atari, Viglen etc)
	Video 7
	Trident (legal versions only) (Morse, ZyMOS)
Animation	Flicker free. Any section or zoom, 400 x 300 x 7 (VGA EGA)
Contents	Manual, PC card, software
Input connector	9 way D socket
Price	£137.50 (rally price) plus £3.50 postage and packing

Available from

Henry Neale
Thornlea Fishersgate Sutton St James
Spalding Lincs Tel. 0945 85353

RIG Timestep PROsat II

The PROsat II Weather Satellite system is for those users with a good PC. The system will outperform most Apple MAC II and other systems up to £25,000.00 with ease !

The system receives Meteosat, NOAA, GOES, GMS, Meteor synchronous, Meteor assynchronous, Okean synchronous and Okean assynchronous, also Feng Yun when available. High quality images are displayed in 1024 x 768 pixel resolution with 64 grey levels or 256 colours.
1024 x 768 in 256 greys is available for the Hercules Graphics Workstation Card !

Animation is available from Meteosat. This stunning facility is best shown when watching storms develop and move across the Earths surface. Up to 100 images can be automatically animated. More importantly, unlike other systems it shows the last 100 frames continuously, you don't have to ask it to show you, it's on the screen all the time. Also, unlike other systems when all 100 frames have been received it doesn't just stop, it carries on and replaces the earliest frame with the latest one. In other words every time you pass by the PROsat you will see the last 100 frames.

Meteosat Animation

Full screen animation of 100 frames

Zoom mode in animation

User definable grey scale

NOAA Meteor Okean Feng Yun Polar Option

Live display of incoming images

Saves COMPLETE pass in full resolution (2.4MB file)

3D and image processing

Temperature readout with no calibration needed

Automatic Latitude and Longitude Griding

Your location shown on image

Temperature slice for ice floe studies

Meteosat still frame

Laser dump built in

Live display of incoming images

Auto Schedule for saving in your absence

Zoom and Pan to greater than pixel level

3 D display option

Histogram equalisation for best contrast

Smoothing filter

Edge enhancement filter

Median filter to remove annoying country outlines

Transect from ANY two points

False colour with autoshade

General

This new card with gold plating has built in relay switching for two receivers. It is fully mouse driven with easy intuitive pull down windows. It will run with the new Tseng ET4000 and Trident 8900 cards in 1024 x 768 x 256 in all modes (except animation). This feature allows maximum resolution in real time.

It will only work with a 286 or better PC with VGA and a properly formatted hard drive.
Super VGA and a mouse are required for some facilities.

See James Brown's review in RIG 26 for an impartial users impression.

The Retail price is £499.99 but can be bought from Henry Neale for only £250.00 plus £3.00 post and packing. You can upgrade your PCSAT III if you return the original unmodified card and discs directly to timestep for £120.00 inc. You must be a RIG member to qualify for these prices.

Henry Neale
Thornlea Fishers Gate Sutton St James
Spalding Lincs. Tel. 0945 85353

PROLOGUE COMPUTERS LTD

2 ORCHARD RISE, OLVESTON, BRISTOL
BS12 3DY. TEL 0454 612882/325430

□ COMPUTERS

Professional quality systems at discount prices. Ideally suited for use with the RIG - Timestep Interface/Software, at display resolutions up to 1024 x 768 Pixels With Super VGA monitor.

368sx 20MHz 1Mb RAM (expandable to 8Mb) Teac 1.2 or 1.44Mb Floppy drive.
Small footprint high quality metal case, 200W PSU. 4 Free Expansion slots.
14" SVGA Colour monitor Tseng Labs ET4000 (1024x768x256) VGA Card.
40Mb Hard Disk, Latest AMI BIOS. £847.00

386 DX-33MHz. 32Kb Cache, 2Mb RAM (expandable to 8Mb). Teac 1.2/1.44Mb drive.
Small footprint high quality metal case, 200W PSU. 4 Free expansion slots.
14" SVGA Colour monitor Tseng Labs ET4000 (1024x768x256) VGA Card.
40Mb Hard Disk,Latest AMI BIOS. £1056.00

486 -33MHz. 64Kb Cache, 2Mb RAM (expandable to 32Mb). Teac 1.2/1.44Mb drive.
Small footprint or full AT case, 200W PSU. 3/5 Free expansion slots.
14" SVGA colour monitor Tseng Labs ET4000 (1024x768x256) VGA Card.
40Mb Hard Disk,Latest AMI BIOS. £1277.00

□ OPTIONS:

VGA Mono monitor 14" (640 x 480).....Less £168.75
Memory Upgrade per Mb.....ADD £35
1 Yr On Site Maintenance (By Service Data Ltd)..ADD £70
Mini Tower Case (Leaves 5 free expansion slots) ADD £10
89Mb 15ms Hard Drive..... ADD £130
Serial Mouse.....ADD.£20
MS DOS v3.3.....ADD £23
MS DOS V5.0.....ADD £49

□ COMPONENTS:

MOTHERBOARDS : XT-12 £56, 286-12 £63, 386SX-20 £199, 386-33 £299.
VGA CARDS : Paradise 256kb (640x480x16 colours, upgradable to 512kb) £70.00
Paradise 512kb (640x480x256 colour etc.) £85.00
Tseng Labs 1Mb (1024x768x256 colours, etc) £102.50
MONITORS : 14" VGA Mono £85, 14" VGA colour £199
14" Super VGA colour £215, 14" Multiscan Colour £265
FLOPPY DRIVES : TEAC 360/720Kb £48, 1.2/1.44Mb £51
HARD DISKS : SEAGATE ST251-1 40mb 28ms £175, 42Mb IDE 25ms £128.

Please call for further information on systems and components (Day/Evening)
All prices EXCLUDE VAT. Delivery - 5 Days (Components), 10 Days (Computers).

ITS NOT A FRAMESTORE, AND IT WON'T RUN ON A PC - WHAT IS IT?

This is what *Amiga Shopper* magazine had to say....

"Excellent program which takes full advantage of the Amiga's possibilities"

"If you want to get into satellite reception, this is the way to go"

"By way of conclusion, Amigasat is an excellent program. The program makes capturing images easy, and furthermore, it provides plenty of tools for tweaking the images to remove noise and transmission errors, as well as enhancing obscure details."

" ...it is worth every penny"

- Decodes NOAA, Meteosat, Okean, Meteor, including the Meteosat digital header
- Decoded and stored in full 8-bit resolution
- Extensive use of software DSP techniques throughout, including high performance demodulation performed entirely in software.
- Full support for multiple images, inter-image processing on part or full images, including maths functions, image addition, subtraction, and multiplication.
- Fixed and user-defined zoom to any resolution.
- Images completely compatible with other Amiga IFF processing packages.

AMIGASAT 2.0

- Probably the finest weather satellite system in the World

martelec *communication systems*

The Acorns, Wyck Lane, East Worldham, Alton, Hampshire GU34 3AW, U.K. Tel/Fax 0420 82752

OMNIFAX 3

Facsimile or Weather Sat?

Both! In one package, Omnifax gives you the software and interface card for both facsimile and wxsat reception. The latest version of Omnifax is even better, and represents superb value - especially if your interests span both weather satellite and facsimile recption. The package contains a comprehensive interface card for the demodulation of ***all*** satellite and facsimile modes. In addition, the interface contains all the necessary hardware for the optional SSTV and CW/RTTY/ASCII packages.

Separate inputs are provided for fax and wxsat, enabling the permanent connection to their respective receivers. Omnifax runs on any AT machine (286, 386, 486) and some faster XTs (10MHz and faster).

Facsimile Reception

Probably the most comprehensive system ever offered for the reception of facsimile transmissions - decoding all standards found on VLF, through to UHF, including amateur fax, press fax (incl. colour), meteorological charts etc. The package provides automatic scrolling, and caters for IOCs of 144, 264, 267, 353, and 576 and drum speeds of 60, 90, 120, 180, and 240rpm. There is software shift selection to allow for 1900+400Hz or 1900+150Hz signals. The drumspeed reference is quartz stabilized for accurate and stable image framing, and the images may be scanned in any of four directions.

Weather Satellite Imaging

Decodes Meteosat, NOAA, Meteor, Okean, Cosmos etc. with all sync tones detected. IMages are displayed in either EGA, VGA, or SVGA formats with excellent clarity and definition. Images are decoded and stored in full 8-bit resolution. The system features fully automatic reception capability, programmable timer, multi-sequence animation, and superb printer dumps for laser and dot matrix printers.

Price £169.36

(Price excludes carriage at £4, and VAT)

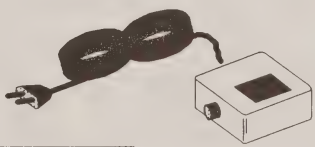
AA-40 ACTIVE ANTENNA

A high Gain, Low Noise Antenna, ideal for VLF, MF, and HF reception from 50KHz to 40MHz.

The antenna is very compact, measuring approximately 1 metre high, and is fully enclosed in a protective PVA sleeve. Intended for outdoor mounting, the AA-40 is the perfect answer for those long, meduim, and shortwave listeners requiring a compact, easily mounted antenna, capable of reception equal or better than can be achieved from much larger arrays.

The AA-40 comes complete with:-

- *Active Rod Antenna*
- *Power Supply / Signal Feedthrough Unit*
- *Mounting Brackets*



Special Introductory Price £56

(price includes carriage, but excludes VAT)

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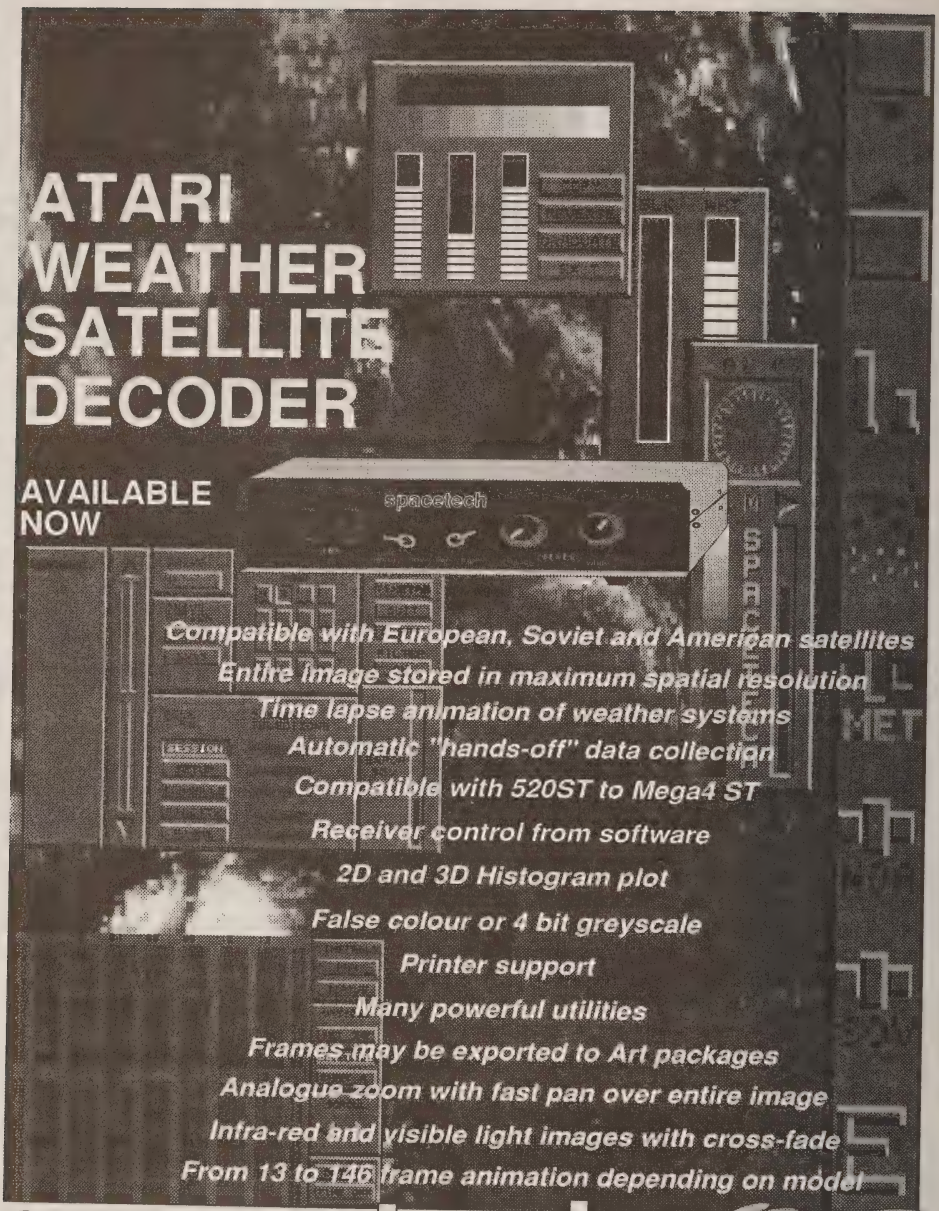
The Acorns, Wyck Lane, East Worldham, Alton, Hampshire GU34 3AW, U.K. Tel/Fax 0420 82752


ATARI
WEATHER
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spacetech
Compatible with European, Soviet and American satellites
Entire image stored in maximum spatial resolution
Time lapse animation of weather systems
Automatic "hands-off" data collection
Compatible with 520ST to Mega4 ST
Receiver control from software
2D and 3D Histogram plot
False colour or 4 bit greyscale
Printer support
Many powerful utilities
Frames may be exported to Art packages
Analogue zoom with fast pan over entire image
Infra-red and visible light images with cross-fade
From 13 to 146 frame animation depending on model

spacetech

space science resources

21 West Wools, Portland, Dorset DT5 2EA. U.K. Tel. 0305 822753 Fax. 0305 860483

FRAMESTORE or PC or Amiga ? Part II

Feature	PC Framestore Amiga
Screen resolution	1024 x 768 x 256
Number of colours	256 out of 1/4 million
Animation	up to 100 frames
Save image in full resolution for later use	YES
Printer facility using laser printers	YES
NOAA and ALL Polar satellites	YES
Meteosat and ALL Geostationary	YES
NOAA HRPT option	YES available now
Meteosat PDUS Primary Data	YES available now
Cost to upgrade per 1 Megabyte	**£29.00**
Cost to upgrade to 40 Megabyte hard disk	£135.00
Runs industry standard software	YES
RIG PCSAT III Software included	YES
Total cost INCLUDING PCSAT III software	£599.00
Completely built including mains plug	YES

We firmly believe that the PC is the best solution for Weather Satellite use. The on screen resolution of 1024 pixels, 768 lines and 256 colours is superb. The ability to add memory at just £29.00 per megabyte is incredible. The 40 Megabyte hard drive at £135.00 is amazing. HRPT and Meteosat Primary data will work on the PC AND we can demonstrate this NOW !

Why don't you look carefully at other systems, add ALL the costs and see how they compare. Fill in the details on this page. Check carefully that the new Soviet Meteors and Okeans are fully covered. Check that you can see HRPT and Primary Data working NOW, we all know what "we are working on it" means. Check that everything is in stock. Check on the availability and price of upgrades. Ask other users and RIG members. Then and only then decide what your future in weather satellites is going to be !

What do you get ? A 386 16Mhz computer in a real metal case with a 200W full spec power supply. 2 serial ports and 1 parallel port. A full AT keyboard. 1Mb of RAM. A 1.44 or 1.2Mb drive. A 1024 x 768 x 256 colour ET4000 video card. MS-DOS 5.0. RIG PCSAT III card and all software. In fact a fully featured 386 computer and RIG PCSAT III ready to go. The 386SX motherboard will **DIRECTLY address up to 16Mb** of cheap on board memory (eat your heart out Amiga owners !).

1024 x 768 x 256 shop soiled 0.28mm pitch colour monitors £129.00

In line with our competitors, the prices in this advertisement do not include VAT at 17.5% or carriage at £15.00

Timestep
Wickhambrook Newmarket CB8 8QA England
Tel. 0440 820040 Fax. 0440 820281

TIMESTEP

HRPT System

Noise-free digital HRPT transmissions from NOAA, with a ground resolution of just 1.1km, allow images to be received in incredible clarity. Rivers, lakes, mountains, cities and even small towns can be seen on good days. Fishermen will appreciate the increased resolution of sea surface temperatures.

Image processing, including variable and histogram contrast equalisation combined with full colour editing, gives the best possible results from any image. Colour enhancement allows sea surface temperature and land details to stand out in high contrast. Any number of colour palettes can be saved for future use. The sophisticated mouse-driven software allows all five bands to be saved and displayed on nearly all VGA and SVGA cards right up to 1024 pixels, 768 lines and 256 colours.

Zoom to greater than pixel level is available from both a mouse-driven zoom box or using a roaming zoom that allows real time dynamic panning.

Sections of the image may be saved and converted to GIF images for easy exchange.

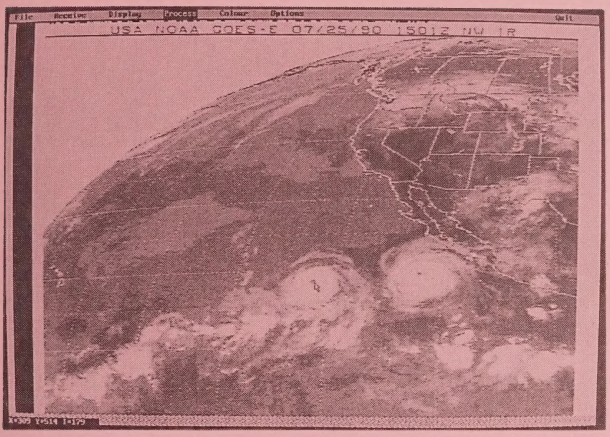
Latitude and longitude gridding combined with a mouse pointer readout of temperature will be available late in 1991.

Tracking the satellite is easy and fun! Manual tracking is very simple as the pass is about 15 minutes long. A tracking system is under development and expected by the end of 1991. A 4-foot dish and good pre-amplifier are recommended. The Timestep Receiver is self-contained in an external case and features multi-channel operation and a moving-coil S meter for precise signal strength measurement and tracking. The data card is a Timestep design made under licence from John DuBois and Ed Murashie.

Complete systems are available, call or write for a colour brochure.

USA Amateur Dealer. Spectrum International, P.O. Box 1084, Concord, Massachusetts 01742. Tel: 508 263 2145

TIMESTEP WEATHER SYSTEMS
Wickhambrook Newmarket CB8 8QA England Tel: (0440) 820040 Fax: (0440) 820281



VGASAT IV & MegaNOAA APT Systems

1024 x 768 x 256 Resolution and 3D

The Timestep Satellite System can receive images from Meteosat, GOES, GMS, NOAA, Meteor, Okean and Feng Yun. Using an IBM PC-compatible computer enables the display of up to 1024 pixels, 768 lines and 256 simultaneous colours or grey shades depending on the graphic card fitted. We actively support nearly all known VGA and SVGA cards. Extensive image processing includes realistic 3D projection.

100 Frame Automatic Animation

Animation of up to 100 full screen frames from GOES and Meteosat is built in. We call this 'stand alone animation' as it automatically receives images, stores them and continuously displays them. Old images are automatically deleted and updated with new images. The smooth animated images are completely flicker-free. Once set in operation with a single mouse click, the program will always show the latest animation sequence without any further operator action.

NOAA Gridding and Temperature Calibration

The innovative MegaNOAA program will take the whole pass of an orbiting satellite and store the complete data. Automatic gridding and a 'you are here' function help image-interpretation on cloudy winter days. Spectacular colour is built in for sunny summer days. Self-calibrating temperature readout enables the mouse pointer to show longitude, latitude and temperature simultaneously.

Equipment

Meteosat/Goes

❒ 1.0M dish antenna (UK only) ❒ Yagi antenna
❒ Preamplifier ❒ 20M microwave cable
❒ Meteosat/GOES receiver
❒ VGASAT IV capture card
❒ Capture card/receiver cable
❒ Dish feed (coffee tin type)

Polar/NOAA

❒ Crossed dipole antenna
❒ Quadrifilar Helix antenna (late 1991) ❒ Preamplifier
❒ 2 channel NOAA receiver ❒ PROscan receiver
❒ Capture card/receiver cable

Call or write for further information.

USA Education Dealer. Fisher Scientific, Educational Materials Division, 4901 W. LeMoyne Street, Chicago, IL 60651. Tel: 1-800-621-4769

USA Amateur Dealer. Spectrum International, P.O. Box 1084, Concord, Massachusetts 01742. Tel: 508 263 2145

TIMESTEP WEATHER SYSTEMS

Wickhambrook Newmarket CB8 8QA England Tel: (0440) 820040 Fax: (0440) 820281

The World of Weather

As well as complete systems, Timestep allow you to buy all the parts separately. The quickest and least painful approach is simply to buy a complete system. Take your time and take advantage of our RIG special prices (UK only), you will save some money ! The parts you will need assuming you are using the IBM type PC approach are :-

Meteosat

Meteosat is probably the best place to start. It sends images constantly. Remember you do not need a NOAA receiver if you use our Meteosat Receiver (designed to work only with a preamplifier).
This will free your NOAA system to look for the Soviet polar orbiters, something every satellite enthusiast should be doing !

Timestep products (world prices)	Britain	Europe	USA	RIG UK Members
1.0M dish antenna and feed horn	£164.95	£215.00	N/A	£139.95
Meteosat P-HEMT pre-amp (essential)	£184.00	£210.00	$350.00	£124.95
20M cable	£ 19.95	£21.00	$ 69.95	£ 16.95
Meteosat receiver	£199.00	£225.00	$399.00	£169.95
PCSAT III interface card	£199.00	£225.00	$299.00	Henry Neale
PROsat II card and software	£399.00	£425.00	$399.00	Henry Neale
PCSAT III connecting cable	£ 14.95	£ 19.95	$ 29.00	£ 9.95
Dish feed (coffee can type)	£ 49.95	£ 58.50	$ 99.00	£ 29.95

Superior Pager Resistant Receiver !

or your money back !

Now many RIG members have pager free reception on their new Timestep receivers. Why not join them ? The scanning receiver covers all known satellites including the complete Soviet series.

Crossed dipole antenna	£ 54.95	£ 65.00	$ 99.00	£ 39.95
NOAA pre-amplifier	£ 29.95	£ 34.50	$ 72.00	£ 24.95
50M cable	£ 39.95	£ 42.00	$139.95	£ 34.95
PROscan receiver	£299.00	£325.00	$560.00	£249.95
Track II, PC prediction	£ 29.95	£ 29.95	$49.95	£ 24.95

HRPT

6 channel complete receiver, pre-amp input, data output	£499.00
PC Data card and software including gridding and temperature calibration	£199.00

Primary Data

PDUS data card and software	£399.00	£425.00	N/A	£299.00
PDUS 2 channel receiver	£799.00	£825.00	N/A	£499.00

All prices include VAT at 17.5% and carriage in Britain, and Air carriage to other destinations.

Timestep
Wickhambrook Newmarket CB8 8QA England
Tel. 0440 820040 Fax. 0440 820281